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EDITORIAL NOTES—GAS, &c.

The Gas Coal Position.

IF the reports from the several coal districts are pieced together, it is as manifest as anything can be that a deadset is being made against gas coal purchasers by colliery proprietors; and the gas industry has to face that hard fact, and not allow themselves to be cajoled by bland negation into the belief that the idea is the offspring of deceptive appearances. The existence of local associations of coal owners is no new thing; and such associations are of the first importance to them in the cause of protection apart from the question of price. But hitherto there has been fair and open competition for contracts between district and district. And when one district has endeavoured to permanently raise the level of prices, those endeavours have been neutralized (to use the expression of a coal contemporary) by severe competition from other quarters. This severity of competition for contracts is a flat contradiction of the cry of lean profits. It was reported last week, from a Sheffield source, that the colliery owners of Yorkshire, Lancashire, Derbyshire, and Notts., had now entered into an arrangement for the purpose of putting contract prices of gas coal on to a permanently higher level; and this week the "Iron "and Coal Trades Review," in a degree, confirms this. The aspirations of the South Yorkshire owners to permanently maintain a higher range of prices, have been checked by the opposing operations of the Derbyshire and Notts. owners to get the South Yorkshire business. It is, to say the least, a singular aspect of affairs that there should have been this great struggling and anxiety to secure contracts bearing, according to allegation, such emaciated profits that they were hardly worth picking up. There seems to be little question that the coal owners in these counties are now working in unison; and this is why market reporters send the intelligence that there is a much "brighter outlook" for the gas coal branch of the trade. We are quite at one with our coal contemporary in the truism that it is the effect rather than the existence of an association which counts in industrial matters; but we can see a vast difference between the effects of local associations whose mobility and action are independent, and the same associations operating under the interdiction imposed by mutual understandings. The Durham coal owners have proclaimed their spotlessness from what they obviously regard as such an unclean thing as combination or working arrangement. But the Durham coal owners know full well that what is being done elsewhere answers their purpose admirably; as Durham gas coal will always, for distant or local consumption, command prices above those set elsewhere. There would be, as Sir George Livesey said at the South Suburban Gas Company's meeting, no objection to combinations or understandings, nor even to a fair permanent increase in the level of values, if there were not these outrageous and unsettling inflations, which miners' wages, railway difficulties, the shortening of output, demand, or a reasonable additional profit in view of greater trade requirement both for home and export, are not sufficient to account for. The gas industry presents no differences in the present from the immediate past; and therefore the brighter outlook—from the eyrie of coal owners—to which the market reporters refer can only be one of their own invention.

The neatly-feigned umbrage of the coal proprietors at the protest that the gas industry has made has had no effect in stemming the flow of that protest, as will be seen by the speeches of Sir George Livesey at the meeting of the South Suburban Gas Company, Mr. Corbet Woodall at the Tottenham and Edmonton meeting, Mr. Charles Hussey at Croydon, Mr. Alexander Dickson at Bromley, and in most of the other places where gas proprietors have been assembling this last week. But the protestations from the side of the coal owners as to their altruistic attitude in the past and the unprofitable character of the gas-coal business still continue. "For a "long time past this has been," says one writer, "the most "unprofitable part of the coal owners' business." The keen anxiety to get that business effaces truth from the statement. Other strange features of the situation are the incompatible reasons given for the present extravagant views. On the one hand, there is attempted justification on the score of rising expenses, difficulties, and industrial demand, and, on the other, it is said the coal owners have discovered an abnormal wealth in the divisible profits of the gas industry of which they want a further share. The contrary reasons indicate the poverty of excuse. The one submits necessity; the other admits pure selfishness and plunder. The coal owners ought, in honour, to choose one or the other, and let us know precisely where we are. As Sir George Livesey mentioned at the South Suburban meeting, a 5 per cent. increase on miners' wages only represents an addition of 3d. per ton to the price of coal; and railway difficulties, experience shows, have been overcome. As to the shortening of output, from Yorkshire it is reported that at all the gas coal pits full time is being worked; and as to the demand, with the lighter days the pressure of delivery under contracts is being reduced. The demand for household coal is also easier. However the position for future contracts is looked at, the decision of the coal proprietors to stand firm for exorbitant prices has an insufficient support. Then as to the wealth of profit from the gas-supply industry. The compulsory issuing of capital under the auction clauses and by tender commands prices that only return to investors between 4 and 5 per cent.; so that the coal owners have in their so-called "lean" years been better off than the gas investor. In this connection, Sir George Livesey, in his South Metropolitan speech, came into collision with the "Iron and Coal Trades Review." That paper had stated that the "balance of revenue over "expenditure" of the Gaslight and Coke Company last half year was above 1s. per 1000 cubic feet of gas sold, while Sir George maintained that the "surplus" of the Company was only equal to a farthing per 1000 cubic feet. The difference arises from the point of view. When speaking of the "balance of revenue over expenditure," the "Review" did not deduct interest, and they ignored the statutory obligations of the Company before arriving at the balance of profit from the half-year's earnings available for dividend. Sir George took these matters into consideration; and evidently his reference to "surplus" was the balance of the half-year's earnings after paying a dividend of £4 8s. per cent. Another point advanced in the attempted whitewashing of the coal proprietors is "that collieries, unlike gas "companies, have no monopoly, and that they cannot secure "prices which are not regulated by the law of supply and "demand." The vacuity of the argument is brought into relief by the present experience, which shows that for special classes of coal—such as that required by gas undertakings—it is not a difficult thing for the owners to establish a *quasi*-monopoly, and obtain inflated prices. It is irritating to gas administrators, when straining every nerve to secure economies within their works to enable them to reduce gas prices so as to better meet competition (which competition is a potent factor in addition to the statutory sliding-scale in regulating gas prices), to have the advantage of these various economies filched from them in the manner of the present—more especially in view of the fact that what they have done in producing economy has wrought marvellously in bringing to a nearer level than before the demand for gas in summer and winter, which, in turn, has conferred benefit upon the coal proprietors, by putting into their hands a regularity of demand such as no other industry can offer them.

The fact that report is made that full time is being worked at certain gas coal pits, in the face of a declining rate of delivery on current contracts, suggests that there must be a cause or causes for this. In the first place, two or three of the coal market reports this week refer to the contracts

that are being made by foreign gas undertakings at advanced prices—13s. 3d. and 13s. 6d. f.o.b. being mentioned in published statements; and the prices so set are being used to force the pace for home requirements. Mr. Woodall and several other Chairmen last week added their condemnation of the removal of the duty on exported coal. When interests in which one is concerned are affected by ill-conceived action or economic fallacy, the ill-conception and the fallacy become, as in this case, more strongly defined. The new contracts for foreign delivery are one cause of the activity at the gas coal pits. Another cause is—again the reports from the markets declare it—that all the gas coals that come on to the market are now being snapped up at current prices. We can only hope that these are not panic purchases, because any such action, unless favourable prices can be obtained, will only assist, as the foreign gas coal contracts are doing, in hardening the position of the coal owners. Not at all disinterested is the advice of the "Iron "and Coal Trades Review" to the smaller gas undertakings not to hold out for lower prices, on the ground that this would be to the advantage of the large gas undertakings like the Gaslight and Coke and the South Metropolitan Gas Companies. "If the smaller buyers will take the hint," says our coal contemporary, "they will see that no one laughs "up his sleeve at their expense." The reply is that the Directors and Committees of the small gas undertakings have no more desire to have the coal proprietors laugh up their sleeves at their expense than they have that the administrators of the large undertakings should do so. They know which of the two is their best friend. Sir George Livesey and Mr. Woodall are both interested in smaller gas concerns than the two named; and if their attack on the unreasonable demands of the coal owners was only dictated by the motive attributed to them rather than by the motives engendered by a common cause, they would use the influence of the greatness of their undertakings to compass their ends by private negotiation. The winter pressure will soon be over; and there can be no possible use in rushing in while any pressure continues. An easier demand should, if the submission of justification through present conditions has any reality, produce a moderation of the coal owners' views. Contracts had better be negotiated at the customary time, so as not to play into avaricious hands by any solid contracting through undue haste or procrastination.

From the present to the future. Both Sir George Livesey and Mr. Corbet Woodall have, at meetings, suggested means for preventing injurious fluctuations of coal prices. Sir George believes, if the claims of the miners are at the bottom of the trouble, that the owners have the remedy in their own hands by putting the men in the position of becoming property owners; while Mr. Woodall believes that if "this "great necessity of the nation is to be in the hands of "individual owners, they should be subject to regulation "and control, as is the industry with which we are asso-"ciated. Prices yielding a fair return to the vendors would "be found on the average of years more advantageous than "one year of immense profit followed by many of leanness "and of comparative poverty." Here we have suggestions that may be commended to the earnest consideration of those who produce, as well as those who use, the most important factor in the material welfare of this country that Mother Earth yields.

A Presidential Address.

THE address with which Mr. W. Prince, of Stoke-on-Trent, inaugurated his year of office as President of the Manchester Institution of Gas Engineers, reflects personal experience and views on many matters pertaining to gas engineering and management; and if it emphasizes one thing more than another, it is how numerous are the directions claiming from the chief technical and administrative officer of a gas undertaking mental exercise and surveillance, together with active performance. There can be no suspension of vigour in any one road. If there is, something suffers; and this may offset the gains in other directions. The President takes us from carbonizing operations to the energy necessary in pushing business; and, on all points, he exhibits himself as holding those broad views that give activity the play that is so desirable in every business enterprise that, encouraged, progresses as vigorously as does the gas industry. Mr. Prince appreciates fully how Science and time and labour saving machinery are becoming more and more important as auxiliaries in our industrial advancement. But in regard to all time and labour saving appliances, it must not be overlooked, as Mr. J. W. Helps has recently been reminding us, how much the benefit to be realized from them depends on their intelligent handling by the men. The vertical retort, it is expected and hoped, will prove another helper in forwarding the economics of gas production. While the President does not commit himself to any expression of view regarding the vertical retort system, it may, in passing, be mentioned that the Directors of the Bournemouth Gas Company, from the experiences that are now accruing at their works, speak in confident tone of the problem of continuous carbonization having now been solved. However, there is promise of valuable contributions to the general subject in the course of the present year. But turning from the new to the established practices in carbonization, too much stress cannot be laid upon the advantages of maintaining uniform conditions within retorts. The President on this point adds his testimony to the already large accumulation respecting the value to this end of the use of retort-governors, as originally advocated by Mr. Charles Carpenter. It is a rapidly growing practice; and one that has clearly come to stay, with such advantages obtaining as increased make of gas per ton and the maintenance of uniform candle power. And supplemental benefit, in avoiding trouble in these days of high heats, is found at Stoke-on-Trent (as elsewhere) by the adoption of tar-towers.

The subject of naphthalene has place in the address; and the President certifies, by data, the relief he has obtained by the simple process of introducing solvene into his Livesey washer. It would have been instructive if he had extended his observations to an explanation of the passage in the address which informs us that "at Stoke-on-Trent, we have "experienced serious difficulties for many years through "the deposition of naphthalene in the distributing system, "and *particularly so before* the introduction of either genera-"tors or regenerators into our works." This is an interesting statement, as it reverses the general experience, which has been that, with the higher heats accompanying the adoption of generators and regenerators, there has been anything but a modification of the naphthalene trouble. Perhaps the explanation of the alleviation of the anxiety and difficulty at Stoke-on-Trent is traceable to the simultaneous introduction with modern settings of one or more of the adjunctive improvements already referred to. The regret of the President that the naphthalene inquiry of the Southern Association came to an untimely end through lack of funds will be endorsed by many in the profession; but the mere cause of the untimely end induces reflections as to the prevailing apathy on the question of the financing of technical research in the gas industry. The hope expressed that the Institution of Gas Engineers may be able to take up the investigation where it was relinquished by the Southern Association is shared by us. But here, again, crops up the eternal question of ways and means; and we fear that the President's commendation of the appeal made by the Council of the Institution for subscriptions to the Special Purposes Fund, designed chiefly for the prosecution of technical research, will—it is regrettable to have to say it—bear little result. The Council of the Institution have been, as a body, the object of a fair amount of adverse criticism; and it is therefore refreshing to have the independent evidence of one who has seen the inner workings of the Council, as a district representative, as to the life and full recognition of responsibilities that exist in their midst. The assurance and the denial it gives to external stricture, clearly show the value of district representation.

In another section of the address, the vexed question of the assessment of gas undertakings is touched upon. The vagaries of rating are the subject of illustration from Stoke-on-Trent and neighbouring undertakings. But the tabular statement prepared by the President presents very distinctly the fact that latter-day local dispensation has inflicted greater burdens by monstrous rate poundages than have the rating authorities by the—admittedly extraordinary—latitude they give to their valuations. There is this difference, too, that against over-valuation there is appeal; against the exactions of those who levy the rates there is only the appeal through the *vox populi*. A comparison of the present with some years ago respecting the rates paid per 1000 cubic feet is really of little value. So tested, in the case of these Potteries undertakings, the variations in some instances are not great. Times have changed. The day consumption has given fuller occupation to plant; and this has made all the difference to comparative averages on the 1000 cubic feet basis. Given

more economical local administration, the increased output of gas brought about by day use would have caused the rates paid per 1000 cubic feet to show a marked decline, rather than the maintenance of the average, or slight increases, or small fractional recessions. If the President's suggestion that a fixed sum should be paid for rates per 1000 cubic feet of gas sold or per ton of coal carbonized were adopted as "an equitable solution of a knotty problem," it would mean the taxing of all economies in working and of all effort to realize, in actual business, as near as possible the maximum plant capacity.

A large part of the meeting was occupied by the adjourned discussions on Mr. George Stevenson's paper on "Expe- "riences in Competition for Power," and on Mr. Edward Allen's controversial communication on "High *v.* Low Grade "Gas." The debates were long and complete; both topics being much to the argumentative taste of the members. Comment and criticism on both communications appeared in these columns on Nov. 27 last; but space will not permit of reference to the discussions this week.

Municipal and Company Co-Partnership.

BETWEEN the President of the Board of Trade and the President of the Local Government Board there appears to be a difference of opinion. Mr. Lloyd-George believes that we cannot do without private enterprise; Mr. Burns believes that private enterprise stands for robbery, jobbery, and corruption, and all that is bad, and therefore the less we have of it the better. Mr. Lloyd-George, however, is more charitable, and entertains the opinion that municipalities might with advantage co-operate with private enterprise. The meaning of "co-operation" here is co-partnership without any of the risks falling on the municipalities. This plan is an addition to the doctrinal professions of the President of the Board of Trade; and its enunciation has caused a Special Representative of the "Pall Mall Gazette" to endeavour to divert into a new channel the discussion of the question of the future of electricity supply in London. The dangers and difficulties of the London County Council project are fully appreciated by our contemporary; but to its Special Representative, the idea of co-operation between companies and municipalities appeals favourably, though he does not pronouncedly commit himself to it. We hope he will refrain; for the idea is not only hedged with difficulties, but, in our opinion, to give it shape would be a positive danger to those whom a public trading concern is intended to serve. There is a better way of securing the best public service through companies than by co-operating, or having a one-sided co-partnership, with local authorities.

We will deal first with the plan. The Special Representative of our evening contemporary—following up the proposal of Mr. Lloyd-George—submits that the local authority have an asset in the right to concede to a private company the privilege of carrying on (say) an electric supply business within its area, for parting with which right they should be compensated, and the undertaking be carried on without risk of loss to the municipality. The ultimate aim of a municipality in entering into trading (though the aim is, of course, not always successful) is to make profit which can be applied in aid of the rates; and the suggestion of the President of the Board of Trade appeals to the representative of our contemporary as one in which their ambition for profit can be gratified, and yet leave the field free for cultivation by private enterprise. It is all so gloriously simple. All that has to be done is to allow a maximum dividend of 5 per cent. on the capital employed; and after the payment of all costs of generation, as well as capital, establishment, depreciation, and other proper charges, the balance profit would then be shared in agreed proportion, fixed according to circumstances between the company and the local authority—the latter having a sort of consultative control with appeal to the Board of Trade in the event of any differences arising. Here we have the outline of a plan which, it is thought, would constitute a delightfully simple way to the pacification of all trouble between municipalities and private enterprise, and assuage the longing of Socialists, Collectivists, and such gentry for profits from public-supply services.

In certain respects—not in all—the scheme reminds one of the principle of communal concessions to private enterprise which obtains on the Continent, and which does not always work out to the advantage of the consumer. But there has been nearer approach to—in fact, actual practice over a long course of years of—the "co-operative," or one-sided co-partnership, arrangement in Paris; and the result there has not been such as to commend any adoption of similar principles in this country. Take the Paris gas supply as an instance. The chief end of a public supply, or of the working of any protected system of serving the public, ought to be cheapness of commodity; but the attaining of this end was completely and effectually frustrated by the working arrangement between the Paris Municipality and the Gas Company. The Company were allowed to divide a certain amount as interest on their capital investment; and after meeting their outgoings, the Municipality and the Company shared equally the balance of profit. And, as shown in some articles which appeared in the "JOURNAL" about a year ago, it was a handsome sharing; but it was the consumers who suffered. Every attempt that was made to obtain a reduction in price was ineffectual, for reduction to the gas consumers meant reduction of the Municipality's share of the profits. The Company were in the invidious position of having to bear the odium for the high-priced gas; while ensconced safely behind the Company were the real obstructors to reduction in the form of the Municipality. The result was that, until within the last three years of the Company's concession, the price of gas was equal to 6s. 9d. per 1000 cubic feet; while in London prices, with Companies working under the sliding-scale of dividend and price, ranged between 2s. and 3s. When the Paris Gas Company, in the closing years of their existence, did succeed in coming to an arrangement for a reduction to what was still the high price of 4s. 6d., the Municipality obtained an extra annual payment as compensation for the surrender of the additional profit that would have come to them by the retention of the extraordinarily high price. Although provision was made for periodical inquiries by Technical Commissions, they only resulted in the declaration (with the contradiction of gas making throughout the world before them) that there had not been any such improvement in the manufacture of gas as to warrant a lowering of the price to the consumers; and so, as will be seen from the figures in the last of the articles referred to, the Municipality's share of the profits from gas grew as the years progressed.

That is how what Mr. Lloyd-George calls co-operation, and what we prefer to call a one-sided and unjustifiable partnership, worked in Paris. It was a disgrace, and a standing warning of the danger of the adoption of any such plan. It was obstructive to progress, the consumers were robbed, and all the principles of fair-dealing between producer and consumer were dishonoured—What for? To fill with increasing richness the coffers of the Municipality. We want nothing of the kind in England; and Mr. Lloyd-George will do well to say nothing more about the idea. There is a better plan (about which hint has already been made) of controlling the profits of private enterprise operating under parliamentary sanction, and at the same time of benefiting the public, without taking the circuitous course of lifting the money from the pockets of consumers, passing it into the banking accounts of the Companies, thence to the Municipalities, and by them expended to obtain results inconsistent, in the smallness of utility and good, with the amount of their cost. If co-partnership there is to be in electricity supply, let it be direct co-partnership between the supplying companies and the public; whereby shareholders' dividends are varied up or down by, respectively, reductions or increases of price to the public. The sliding-scale of dividend and price has worked well and to the advantage of the public in the case of gas supply through Companies. It is a far better system than that which Paris has shown retards, and does not help forward, the public interests.

Masonic.

Last Friday, at the Midland Hotel, Manchester—in succession to W.Bro. S. R. Ogden, of Blackburn—Bro. W. Prince, of Stoke-on-Trent, was installed W.M. of the "Northern Star Lodge," No. 3053; the Installing Master being W.Bro. R. G. Shadbolt, of Grantham. Subsequently, the following were invested as Officers of the Lodge: Bro. Robert Surtees, of Fenton, S.W.; Bro. William Batt, of Manchester, J.W.; Bro. W. Severs, of Wilmslow, P.P.G. Treasurer of Cheshire, Chaplain; Bro. W. Whatmough, of Heywood, Treasurer; Bro. R. G. Shadbolt, of Grantham, Secretary; Bro. Jno. C. Pennington, of Colwyn Bay, S.D.; Bro. John Mackay, of Bradford, J.D.; Bro. J. W. Broadhead, P.P.G.S.D. West Yorks, of Elland, D.C.; Bro. George B. Smedley, of Swadlincote, I.G.; Bro. H. Barker, of Buxton, Bro. Fred J. West, of Manchester, Bro. S. Meunier, of Stockport, and Bro. J. M'Ewan, of Manchester, Stewards. Bro. T. Duxbury, P.M., P.P.G.A.D.C., is Charity Representative of the Lodge.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 564.)

THE Stock Exchange last week was a prey to a degree of depression for which it is not easy to assign an adequate cause. There were some factors, indeed, which might rather have been expected to exert a contrary influence, but the adverse view prevailed. In the aggregate, business was decidedly quiet; and buyers were a scarce article. The hope that the Rand mines will receive fair treatment at the hands of their new rulers had a favourable influence; and the figures reached by the Bank reserve were comforting, though it was a disappointment to those outside that the inside authorities did not see their way to lowering the rate on Thursday. Home rails were beginning to pick up a little, when the market was distressed by the dreadful calamity in the Great Eastern Continental traffic. The week closed as it had opened, quiet and dull. The Money Market was irregular. A good demand was at first met by a good supply; but about mid-week a shortage was apparent, and the demand became sharper. This position in its turn relaxed, but firmness ruled up till the close. Discount rates were steadily stiff. In the Gas Market, there was a renewal of activity in the earlier portion of the week; but the last two days, transactions fell off considerably in point of number. Prices, where any change at all was made, were almost uniformly lower; and in one or two instances, the fall was considerable. There are, of course, people whose imaginations are easily excited by irresponsible chatter about a coal famine, and who, rushing to realize their stock, bring about the very thing they dread—a fall in price. In Gaslight and Coke issues, the ordinary was active and steady; prices sticking closely to last week's figures, with the narrow range of 95⅝ to 96¼. The secured issues were little dealt in. One deal was marked in the maximum at 88¼, which brought the quotation down a point; the preference changed hands at 106¼ and 107; and the debenture, at from 84½ to 85½. South Metropolitan was very little dealt in, and was unchanged; the few transactions marked being at 124½ and 125. One deal in the debenture was at 85½. Commercials were again, for the second week running, wholly unnoticed. The Suburban and Provincial group was the most conspicuous. Bournemouth "B" marked 17$\frac{1}{16}$, Brentford old was done at 262½ and 263, and then fell 4, while the new fell 5 without business being done. The debenture marked 103 and 103⅛. A parcel of Brighton original was let go at 225, and down came the quotation by 7 points. British was done at 42 free, West Ham at 105½, and ditto preference at 124. Among the Continental Gas Companies, Imperial was quieter, and showed weaker prices—changing hands at prices from 181 to 179. Union was more active, and at lower figures, which ranged from 125 to 124, ditto preference marked 138¼. European fully-paid was quiet and firm at 25 and 25¼. Among the undertakings of the remoter world, Bombay new was done at 5¼, Buenos Ayres at 11⅛ and 11$\frac{15}{16}$, ditto debenture at 94¾, Cape Town at 14, ditto debentures at 52, Primitiva at 7⅛, ditto preference at from 5$\frac{1}{16}$ to 5$\frac{3}{16}$, River Plate at 12½ and 12$\frac{9}{16}$, Monte Video at 11¾ and 11⅞, and San Paulo at 13⅜ and 13¼.

The closing prices are shown in our list on p. 564.

ELECTRIC LIGHTING MEMORANDA.

Progress of the Electricity Supply Industry—A Slowing-Down of the Rate of Advance in Private Business—Motive Power Connections—Getting Rid of the Electricity Burden at Bath.

THE "Electrician" has issued its annual statistics relating to electricity supply in the United Kingdom; and our first words must be of appreciation of the altered form of arrangement, which makes the tables more convenient for reference. A further improvement might be effected by the omission of some of the superfluous particulars which have much the appearance of advertisement—such as the names of the meters used in different towns, and the names of the consulting engineers—and the system of generation and distribution might also be condensed. The space thus saved could be taken up by the retention of the previous year's figures relating to lamp and motor connections and the number of consumers, while changes in prices could be noted. The value of the tables would thus be vastly enhanced. The advance in business of the undertakings would be shown at a glance, without the time-absorbing references to the previous year's tables that is now demanded to ascertain what the fresh tables actually have to teach one. One striking feature that is brought out—by going back twelve months to discover it—is that the rate of progress in connections, taking the undertakings of the United Kingdom as a whole, is on the decline. The connections of both municipal and company undertakings in London and the Provinces are now equal to 1,091,315 kilowatts; last year the total was 1,030,300 kilowatts; so that the increase is 61,015 kilowatts. The average increase for the preceding three years was 142,243 kilowatts; so that the addition for the past year is 81,228 kilowatts below that average.

The first table deals with the undertakings in the United Kingdom without tramway loads. Of these undertakings, there are 275, compared with 262 last year, or an increase of thirteen. In later tables, it is ascertained that there are 125 undertakings now supplying both lighting and tramways—an increase of three in the twelve months. There are now 21 towns taking electricity in bulk—an increase of two in the year. Particulars are given of fourteen power companies, and of eleven upon which either development has been commenced or the powers are still lying dormant. Most of the power companies, however, so far as actual prosperity goes, appear to have fallen into a somewhat somnolent condition, from which all the applied energy does not seem capable of rousing them. The list of projected stations is 59. There were 72 last year; and, as the figures already quoted indicate that only a small proportion has traversed the space between projection and completion, the greater proportion of the projections of a year ago are the projections of to-day. Time is too valuable to count the Provisional Orders that have been granted but still remain undeveloped.

Looking down the statistics of the undertakings without tramway loads, the progress of the majority is painfully slow. The lamp connections, are as is usual with electricity undertakings, reduced to the 8-candle lamp basis. This low basis of calculation makes the figures in certain cases rise to quite noble representation. But if the figures were divided by eight, to see what the numbers would look like if rendered as 64-candle power incandescent gas-lamps, estimation for the figures would freely decline. We have picked out a few concerns with the topmost private connections to show their business status. The electricity supply of London is divided up among 31 undertakings; and those that take the lead in the number of 8-candle power private connections are: The Charing Cross Company (West-end and City undertakings combined), 673,000 8-candle power lamps (the number of consumers is not given). The Kensington and Knightsbridge Company have connected an equivalent of 350,247 8-candle power lamps, distributed among 3957 consumers; the Metropolitan Company, 536,700 8-candle power lamps, with 9370 consumers; and the Marylebone Borough Council, 500,000 8-candle power lamps, with 7000 consumers. Then slipping down to the other end of the scale, the Chiswick undertaking boasts only 31,000 8-candle power connections, and 1080 consumers; the Smithfields Markets Company, 30,000 8-candle power connections, and 390 consumers; and the Southwark Borough Council, 31,821 8-candle power connections, and 278 consumers. In the comments of the "Electrician" on the figures, it is pointed out that the Metropolitan Electric Supply Company no longer maintain their position at the head of the list, owing to the fact that a portion of the Company's undertaking has been transferred to the Marylebone Borough Council. The Charing Cross Company now come to the top in London, and show a "steady" increase on last year's figures. All the other undertakings exhibit a "slight" increase, with the exception of the City of London Company, the County of London Company, and the Shoreditch Borough Council, who return their outputs as being the same as in the previous year. The Southwark Borough Council undertaking presents a "slight" decrease. This looks as though in some districts in London the limits of the scope for business in electricity have been about located.

It is of interest to note how few are the towns in the Provinces that show an exceptional number of connections attenuated to the 8-candle power basis, and how great is the drop between them and undertakings whose field of supply is not complete in the favourable conditions necessary for real commercial success in the supply of electricity. Even in some of the cities and towns where a comparatively large business has been developed, we learn of accretions of business coming in with disappointing difficulty and slowness; and that this is actually so will be shown in a succeeding paragraph. However, taking out some of the undertakings showing superior success, and mentioning them in alphabetical order, there is Bristol, with connections equal to 195,688 8-candle power lamps, and 2827 consumers; Edinburgh, with 621,236 8-candle power lamps, and 9355 consumers; Glasgow, with 1,157,347 8-candle power lamps, and 13,705 consumers; Hull, with 210,101 8-candle power lamps, and 2749 consumers; Leeds, with 300,000 8-candle power lamps, and 5850 consumers; Leicester, with 189,156 8-candle power lamps, and 2774 consumers; Nottingham, with 307,023 8-candle power lamps, and 3194 consumers; Newcastle-upon-Tyne, with 269,263 8-candle power lamps, and 1150 consumers; Portsmouth, with 185,204 8-candle power lamps, and 3600 consumers; and Sheffield with 300,000 8-candle power lamps, and 3150 consumers. The towns succeeding in numerical importance break away from these large figures ("large" as electricity figures go) very considerably. Most of them show totals of consumers connected that are covered by low figures in hundreds; and there is a no mean number of undertakings that have not reached 100 consumers each, and whose connections, reduced to the 8-candle power lamp basis, show how slender is the business done. Here are examples: The connections at Chepstow are equivalent to 1800 8-candle power lamps, distributed among 37 consumers; Church Stretton, 1600 8-candle power lamps, distributed among 50 consumers; Ingleton, 1800 lamps, distributed among 85 consumers; Kildare, 1026 8-candle power lamps, distributed among 46 consumers; and Llangollen, 1000 lamps, distributed among 41 consumers. However, taking the whole of the private lighting, both of municipal and company undertakings in London and the Provinces, it represents a lamp connection of 22,886,700 8-candle power lamps, or including power and public lighting, 36,377,170 8-candle power lamps—that is to say, private lighting is equal to about 63 per cent. of the whole.

Turning back to the statistics published twelve months ago, it

is observed that even the undertakings in the larger provincial cities and towns have not in the interval done anything of a conspicuous character in booking up new consumers. Glasgow and Edinburgh were the best in this regard—the former extending their list of consumers by about 2000 and Edinburgh by 1000. But others show up poorly. Bristol, for instance, only secured in the twelve months 150 new consumers; Hull, 109; Leeds, 350; Leicester, 183; Nottingham, 401; Newcastle and District, 100; Portsmouth, 300; Sheffield, 50. From the noise that is made about the Newcastle Company and its great activity, supplemented by the "Electrical Bulletin," it might have been imagined that something more extensive was being accomplished in obtaining new customers; but it is not surprising that Sheffield shows up so badly, considering the low price of gas in the city. Low-priced gas has its checking influence. If this new custom is the best that can be shown in the large cities and towns, we need not trouble to inquire what has been done in less important ones.

In regard to the great success that is heard of, through interested channels, as to the adoption of electricity for motive power, we do not find its confirmation in the figures given in these tables; and, considering them, it is easy to understand the tortoise-like progress of the electricity power companies. The connections for power purposes are represented in total horse power. Perhaps if it were not for the evidence of these authoritative figures, it would hardly be believed that the total horse power of the motor connections of the 31 undertakings in London only amounts to 38,174. Small wonder that prudent men shake their heads deprecatingly over the proposal to spend millions of money in providing for a visionary power business in London. That the business is not greater, is not due to charges being high; on the contrary, charges for electricity for power purposes in London are as low as any in the country, and some of the undertakings boast that they are now supplying their largest industrial customers at lower figures than the County Council are suggesting in their remarkable scheme. The power connections of the Charing Cross Company are the highest in horse power in the Metropolis; being equal to 9760-horse power. The Notting Hill Company return the lowest, with 155-horse power. It might be expected that, in the great industrial cities of the Provinces, a different state of things would be found; but those who hopefully expect are doomed to disappointment. The horse-power connections of some of the principal cities and towns are as follows: Bristol, 3972-horse power; Coventry, 2346; Edinburgh, 7388; Glasgow, 11,954; Hull, 4434; Leeds, 6175; Newcastle-upon-Tyne, 6500; Nottingham, 2620; Sheffield, 6300. Then, again, for towns of less importance, the figures drop away to very minor ones, until we find that such towns as Aberystwith have connections equalling only 6-horse power; Church Stretton, 2; Colwyn Bay, 7; Fareham, 1; Holyhead, 3; Kilmalcolm, 3; Malvern, 4; Newcastle-under-Lyme, 5; Pembroke, 7; Whitchurch, 5; Woking, 7. Several towns have the word "none" occupying the horse-power column.

There have in many towns been reductions of price to private consumers both for lighting and other purposes; but, in the majority, necessity has compelled the maintenance of the old figures. Respecting the public lighting, the connections have not, except here and there, made any notable upward movement; and it is evident from the prices paid that the electricity suppliers are loth to resign much, if any, of this part of their income. Nernst lamps have been adopted, though not to any important extent, in several towns; and Tantalum lamps are being tried in a few. In two or three places, intimation is made that Osmium lamps are under experiment. But continuous current, alternating current, and voltages have their respective influences with the different lamps in limiting application.

We have devoted so much space to the examination of these returns that general topics must be passed over this week, with one exception. The exception is the important decision of the Electricity Committee of the Bath Corporation respecting the sale of the undertaking to the Somerset and District Electric Power Company. The Committee are quite willing that the city should disburden itself of the incubus that the City Council so light-heartedly took upon themselves a few years ago. We are not surprised at the resolution, when the history of the concern is considered. On the other hand, the undertaking will afford just what the Somerset Company require—a nucleus for their scheme. There are difficulties in the way of transference; but they do not appear insuperable, and in the draft agreement provision has been made for them. The city will (if the Corporation agree to the proposal, and Parliament ratifies it) get their capital expenditure returned, together with two £10,000 bonuses, or, as an alternative, £450 worth of electricity in perpetuity for each bonus. If the Corporation are wise they will take the money, on the principle that "A bird in the hand," &c. At the end of seven years, the Corporation will be allowed to discontinue public lighting by electricity if they so desire, and revert to gas. The lines of the agreement will be found in our "Miscellaneous News." Looking well at them, the Corporation will be unfaithful to the interests of the city if, now that there is the opportunity, they do not recover the capital that has proved, and will continue to prove, within the limits of their supply, so unremunerative. It has not been, nor is it now, a good investment.

Provost Arrol, of Alloa, has resigned his office, on account of ill-health. He was for many years Convener of the Gas Committee of the Corporation.

SOLIDIFYING TAR FOR TRANSPORT.

THOSE who know from experience the great nuisance and expense involved in the transport of tar—the cost of barrels, or special tank-waggons, as well as of conveyance—are sure to welcome any practical system (though it may only be applied with discrimination as to relative advantages to parts of outputs) of being able to render tar into a solid form for ready transmission from the source of production to the place of utilization. Mr. S. G. Coulson has solved the problem; and samples of solidified tar, produced under his invention, have been inspected. The utility of being able to readily convert tar to a solid state appeals somewhat strongly in connection with the development of its uses; as, judging from an analysis of a sample of the solidified article, no harm appears to be inflicted, by the process of solidification, upon the tar—unfitting it for these uses. Of course, this is a point that will have to be taken into fuller consideration, as well as the question of comparative cost, according to the situation of the works where the tar is produced in relation to the place where it is to be employed. Gains shown on a hypothetical case cannot be made to apply universally.

However, to work the patents of Mr. Coulson, a Company, to be known as the Tar (Patents) Solidifying and Distilling Company, has been formed; and allusion was made to this last week, when it was also mentioned that abstracts of the patent specifications of the invention were published in the "JOURNAL" for July 26, 1904, and July 3, 1906. The invention is a very simple one; and an outline of the working for the conversion of the liquid tar to the solid state might be rendered as follows: The crude tar is pumped into a still, about which there is no particular feature. It is boiled there for about four hours. Then it is run off into a tank, wherein it is thoroughly mixed with about 4 or 5 per cent. (according to the quality of the tar) of sulphuric acid, of heavy specific gravity, for about half-an-hour or so—the tar increasing in volume by this mixing. It is then run into another tank, and there solidifies, and the solid tar is the result. It will be seen from this that the process is anything but complicated; but it involves time. The temperature to which the tar is heated is only about 150° Fahr.; and all that is removed is about 4 per cent. of water and the lightest of the oils. Everything else, it is stated, is left in the tar. At the Public Analyst's Laboratory at Sheffield, a report (signed by A. H. Allen and Partners and G. E. Scott-Smith) was made, soon after the issue of Mr. Coulson's first patent specification, upon a sample of the solidified tar; and the following are the analytical results:—

Loss at 100° C. (moisture, &c.)	2·20
Volatile matter	61·71
Fixed carbonaceous matter	35·98
Mineral matter (ash)	0·11
	100·00

As to the costs and profits arising from the distillation and solidification of tar, the following are put forward by the promoters of the Company; the figures being based upon the treatment of 10 tons of tar per day:—

To 10 tons of liquid tar at 19s.	£9	10	0	By light oils, &c., 300 gals. at 3½d.	£4	7	6
,, Labour, fuel, &c., in carrying out the process of solidification.	2	13	0	9 tons 9 cwt. patent solid tar at 25s. 6d.	12	1	0
	£12	3	0		£16	8	6
				Less cost of tar and process.	12	3	0
				Profit	£4	5	6
				By light oils	£4	7	6
				Patent solid tar at 25s. 6d. per ton.	12	1	0
					£16	8	6
				Less cost of process and solidification	2	13	0
					£13	15	6
Or to labour, fuel, &c., in carrying out the process of solidification.	£2	13	0	Price of tar realized per ton	£1	7	6

The profit per year to the users of the process, taking 10 tons per day for 300 working days would be £1200; and, after deducting the Company's royalty, £900.

These figures are given as they are presented by the Company; but we have no means without an actual working test of verifying them. Of course, it may be tar users will continue to prefer to pay £9 10s. for 10 tons of liquid tar than to purchase 9 tons 9 cwt. of solid tar for £12 1s. Human nature is a strange thing. Savings may be promised in barrels and conveyance; but the additional first cost of 51s. and the loss of 11 cwt. of material will weigh with some purchasers.

The question that will be uppermost in the gas-maker's mind will be of what advantage will this system be to him as a producer of tar. There are several suggested answers. In the first place, there will be saving in the cost of the tar barrels or special tank-waggons for transit; against which has to be set the casing for the solidified material. Relief will be given in the handling of the tar from the place of production right through to the place of

utilization, owing to the greater facility of dealing with a solid substance than the viscous material as now sent out. The increased facility for handling should also make a difference to the cost of transit, especially in connection with export; and the same facility, too, should broaden the fields of both purchase and application. Then there is the question of the direct recovery by the gas makers of the crude naphtha and light oils from the tar. These, it is suggested, might be further treated for the manufacture of carbolic acid or used for enriching gas. The tendency being now to lower the illuminating power of gas and not to raise it, the last-named idea, excepting perhaps in a few places, would be but short-lived. The question of the process expanding the marketability of tar is not without interest to the producer, who longingly looks for further benefit from this low-valued residual. The lighter portions of the tar having been driven off in the process of solidification, the tar in its solid form is regarded as being very suitable for road-making purposes; to liquefy it the heat now applied to the "boiling" of ordinary tar for road purposes being quite sufficient. In the making of briquettes, it is said to turn out an article of a firmer character than briquettes made as customarily with pitch as the binder. For the making of acid-proof floors, the solidified tar appears to be particularly applicable, judging from some samples of rock-like flooring that have been submitted for examination. Messrs. J. Hadfield and Sons, of Sheffield, who are experts in asphalte and similar floorings, aver that asphalte made by the aid of this solidified tar is the only real acid-proof material for floors at present on the market. This opens up the prospect of an extended use of tar for paving; and as the "Acidphalte" (as Messrs. Hadfield have appropriately named this paving) sells for 7s. 6d. a yard, or 39s. 6d. per ton on rail at Sheffield, solidified tar should realize a respectable price in this direction. The flooring-blocks by the way can be made in any size or shape. Beyond these uses, the number of which will expand with experience, the solidified tar is said to make a bright and hard-setting varnish for ironwork.

The cost of the plant necessary for the conversion of the liquid tar to the solid state is said to be about £350; or, it is understood, the Company are prepared to supply plant free, charging a royalty of (say) 2s. per ton, with, of course, a guarantee as to the minimum quantity treated.

In dealing with a process of this kind, it is impossible to write definitely, as there is so much that remains to be proved by trial. But we give this notice of the process on the information laid before us, as anything that holds out opportunity for bettering the tar market, or producing more remunerative returns from the commodity, will be appreciated by no one more than the tar producers. For them, the whole point of this or any other process resolves itself into, What is the commercial advantage?

The process is one thing, the new Company is another. The capital is £10,000, divided into 3000 £1 preference shares and 7000 £1 ordinary shares. Of the latter, 2000 ordinary shares have been allotted to the vendors; being payment on account of the rights, licences, and plant. From the statement as to contracts, it is observed that Mr. Coulson, in August last, entered into an agreement with the Water-Works, Lighting, and Power Investment Corporation, Limited—a title which does not appear now for the first time in our pages in connection with company promoting—whereby he assigned his patents to the Corporation, "in consideration of the Corporation installing the invention, and paying the expenses for the erection of a plant, and also gave the Corporation an option to purchase the patents for £2000, and also granted the Corporation a sole and exclusive licence to develop and work the patents in consideration of the Corporation paying him half of the net profit accruing from such working." The Water-Works, Lighting, and Power Investment Corporation are now the vendors; and, under the contract entered into, the Tar (Patents) Solidifying and Distilling Company, Limited, acquire (1) The benefit and rights under the agreement with Mr. Coulson, comprising, the sole and exclusive licence to commercially work the patents in Great Britain—all foreign patents excluded; (2) the vendors' interest in the licence granted to Messrs. Hadfield and Sons; (3) the plant and apparatus now being erected. The royalty reserved and payable to the inventor is 50 per cent. of the net profits made by the Company, with the option and power on the part of the Company of commuting such royalty on payment to him within two years from the date of the agreement with him—Aug. 3, 1906—of £2000, upon which the royalty ceases. The consideration payable to the Vendor Company for Nos. 1, 2, and 3, is £3000 in cash, an allotment of 2000 £1 ordinary fully-paid shares, and an agreement to perform and discharge all the vendors' obligations under the agreement of Aug. 3, 1906. The vendors undertake to pay the costs of the new plant, and their expenses to the date of the erection. The vendor Company—that is to say, the Water-Works, Lighting, and Power Investment Corporation, Limited—do not look as though they intend coming off badly in this bargaining; and after the new Company have apportioned to them the £3000 cash and the £2000 shares and paid off the inventor's £2000 (if that is to be the form of settlement), there will not be much left for the Company with which to commercially develop the tar distilling and solidifying business. The Investment Corporation do not seem to have to do much for the reward they are to receive, which is out of all proportion to that to be secured by the actual inventor of the process. Reverting to the heads of the contract, reference is made in No. 3 to the "plant and apparatus now being erected." At the beginning of the prospectus we read: "The Company have entered into a contract for seven years with a gas company to treat their make of tar; and the necessary plant and apparatus will shortly be completed for working the process and producing the patent solid tar upon a commercial scale, and from which an income will immediately accrue." We suppose this is the plant and apparatus referred to in the contract. The name of the company alluded to is kept secret; but we are wondering whether it is one of the little companies in which the Investment Corporation have been—perhaps still are—directly or indirectly interested. This is not the only respect in which the prospectus is all too vague.

INCREASE IN THE PRICE OF THORIUM.

[COMMUNICATED.]

THE members of the German Thorium Syndicate, who caused a remarkable surprise about a year ago among the makers of incandescent mantles by suddenly reducing the price of nitrate of thorium from 53s. to 27s. per kilogramme, have now made a fresh move by increasing the figure to 32s. At the time of the lowering of the quotation last year, it was stated, on behalf of the Syndicate, that the object of the large concession then made was to meet the impending competition. The high price which had prevailed down to that time had caused special care to be taken in and by the owners of mantle factories to collect residuals and mantle ashes for the purpose of extracting the thorium for working up again; while at the same time certain small firms procured supplies of monazite sand from North America and Brazil for the extraction of the thorium. It was also contended that the lowering of the price was decided upon because the agreement between the German thorium producers and the suppliers of monazite sand would expire on the 1st of July next, and that the former desired to induce the latter to consent to a new arrangement of a character more favourable to the Syndicate. The only results of the diminution in price a year ago—at all events in Germany—were the extinction of some of the smaller mantle makers who had stocks of thorium on hand, and the disquieting of the market.

The present increase of 5s. per kilogramme, which was resolved upon on the 15th inst., has come at the conclusion of the winter lighting season; and it is therefore assumed that the only effects likely to be produced by it will again be the destruction of some of the smaller firms—the reason on this occasion being the non-possession of stocks. The augmentation in price, it is declared, has not had any influence on the market for thorium, as the Syndicate has for some time past taken care that the German market has been over-supplied. Indeed, it is even asserted that, until the day when the increase was decided upon, thorium produced by the Syndicate was being offered in large quantities, partly at the rate of 27s. per kilogramme, and partly at a lower figure, with the intimation that an advance was to be expected sooner or later. It appears that the Syndicate made exceedingly large contracts with mantle makers, owing to the reduction which took place last year; and delivery has to be accepted within the next four months. The tardy manner in which supplies are being requisitioned under these contracts is regarded as the principal cause of the sudden increase in price. It is hoped by this advance to be able to move purchasers all the more easily to receive actual delivery of the large quantities they have contracted for. In the circumstances, the market remains over-supplied; and the advance in price is considered, outside the Syndicate, as being merely nominal in character.

The Future of the Gas-Engine.

Last Friday night, Mr. James M'Kechnie, the Engineering-Director of Messrs. Vickers, Son, and Maxim, Limited, delivered a lecture upon the "Tendency of Developments in Engineering," to the Foremen's Mutual Benefit Society, in the Glasgow and West of Scotland Technical College. In the course of it, he discussed particularly the application of the gas-producer engine for power purposes. After describing various systems, he showed that 1-horse power could be maintained for an hour from each pound of coal; whereas the most economical steam plant required 1½ lbs., and, in many cases, as much as 5 lbs. of coal. Particular reference was made to the Oechelhaeuser gas-engines, ranging up to 2000-horse power, now being manufactured by Messrs. Beardmore. The gas-engine, he said, if universally applied, might result in a saving of £10,000,000 in the coal bill of British factories. From the waste heat in metal furnaces they might get gas to continuously run engines of 500,000-horse power. The gas-engine, because of its economy in coal, would triumph over steam for the merchant marine, and would also open a new era of usefulness for canal transport.

The Annual Meeting of the Irish Association.—The Hon. Secretary of the Association (Mr. James Whimster, of Armagh) is informing the members by circular that the Committee have unanimously decided to hold the annual meeting this year at the usual time—viz., the second Tuesday in August; and that the place will be Dublin, as resolved at the meeting last year. He invites the co-operation of the members in the preparation of a good programme.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Thirty-Seventh Annual Meeting of the Institution was held on Saturday, at the Albion Hotel, Manchester, when there was a good attendance of members. At the commencement of the proceedings, Mr. J. H. Brearley, of Longwood (the retiring President), occupied the chair.

The Hon. Secretary (Mr. H. Kendrick, of Stretford) read the minutes of the last meeting, and they were duly confirmed.

The President explained that the two proposals put forward at the last meeting, with reference to the subscription and the issue of the annual reports, had both been withdrawn. The Committee's proposal was therefore adopted.

The Hon. Secretary announced that he had had letters of regret at being unable to attend the meeting from 36 members, including Mr. Thomas Newbigging, who was suffering from the effects of an attack of influenza.

Resolution of Condolence.

The President said there was one other letter which the Hon. Secretary had received, and which was deemed to necessitate separate consideration. Mr. Watson, of Doncaster, had written saying that his brother was a passenger on the ill-fated *Berlin*, wrecked on the previous Thursday morning off the Hook of Holland, and there was every reason to fear he was drowned. It would also have been observed by the members that Alderman Frankenburg, the Mayor of Salford, had lost a son in the same disaster. The Mayor's hospitality to the members of the Institution was so recent an occurrence, that they could not do less than pass a vote of condolence with him on the loss of his son, and with Mr. Watson on the loss of his brother.

The vote was passed in silence, the members rising in their places.

Annual Report and Accounts.

The report and accounts having been taken as read, they were unanimously adopted, on the motion of Mr. S. Glover (St. Helens), seconded by Mr. W. Hill (Stalybridge).

The following are some extracts from the report:—

The Committee are pleased to present to the members their annual report, and congratulate them upon the prosperity and usefulness of the Institution. All the meetings have been exceptionally well attended throughout the year. The Commercial Sections continue to be well supported, and have been the means of disseminating much useful information among the members. Visits have been paid during the twelve months to Huddersfield, Longwood, Ilkley, and Salford; and appreciation of the manner in which the members have been received and entertained has been duly recorded. The gas-works at all four places were inspected on the invitation of the respective gas authorities. All the officers, committee, and candidates for membership included in the ballot-sheet were elected at the November meeting; the President for the ensuing year being Mr. W. Prince, of Stoke. At the November meeting, 1906, the members decided, after a long discussion, to abandon the old form of quarterly reports, and to issue to the members, on the payment of 2s. 6d. in addition to their ordinary subscription, the volume of "Transactions of District Institutions." The "Question Box" instituted in 1905 has been abandoned owing to lack of support.

During the year arrangements have been finally made for the holding of a Gas Exhibition on unique lines in St. James's Hall, Manchester, from Oct. 23 to Nov. 9, 1907. A strong Advisory Committee has been appointed; and the Council of the Society of British Gas Industries have passed a resolution according it their hearty support, and will appoint some of their number to act with the Advisory Committee on all questions affecting the exhibition. A report was presented to the members at the November meeting which fully explained the position; and it only remains now for all to advertise the exhibition to their consumers to ensure a complete success.

The membership roll shows a slight increase, and now numbers 150. Two members have resigned, and two have ceased membership under Rule XIV., while on the other hand six new members have been added to the roll.

A new departure was made at the November meeting in 1905, when the rules of the Institution were altered to admit of the election of associate members; but so far only two have been elected.

Your Committee record with pleasure the maintained vitality of the Institution; and the increasing interest manifested in the quarterly meetings is a good augury for the future.

On behalf of the Committee,

(Signed) Jno. Hy. Brearley, President.
Feb. 1, 1907. H. Kendrick, Secretary.

The President said that the accounts were not audited at the time they were sent out; but this had since been done.

Mr. Elliott said he and his colleague Mr. Lamb had gone through the books, which were kept in excellent order, and had found everything correct.

Reports of Commercial Sections.

The reports of the Commercial Sections having been taken as read,

The President pointed out to all the members who had not yet joined these sections, the great value they were to the industry, as would be seen at once on perusing the reports. He should much like to see the membership of both sections largely increased.

Manchester Gas Exhibition.

The Hon. Secretary said it was stated in the report that the Council of the Society of British Gas Industries had passed a resolution according the exhibition their hearty support, and had stated their intention of appointing some of their members to act with the Advisory Committee. When this had been done, the Committee would be able to send out circulars to all likely exhibitors. He learnt from the Manager of St. James's Hall that already he had had some twelve to fourteen applications for space.

The Use of Tar in Road Making.

The President announced that a letter had been received from the Roads Improvement Association, who desired to bring prominently before all who were interested in the use of tar for roads a competition which the Association had on the subject. The matter was of such great importance to their industry that he thought he had only to mention it to ensure that each member would do his best to further the trials which were being carried out on the use of tar in the making and covering of roads.

Nomination of the District Member of Council of the Institution of Gas Engineers for 1907-8.

The President announced that the present District Representative, Mr. W. Prince, would retire from office in June.

Mr. T. Duxbury (Oldham) moved that Mr. J. Wilkinson, of Halifax, be nominated as District Representative. Mr. Wilkinson was nominated last year; but, owing to some mistake, his name was not in the hands of the Committee in time. Mr. Wilkinson was well known to the members as a former Secretary of the Institution, and they might be quite sure he would be a good representative.

Mr. S. Glover asked if any steps had been taken to ascertain whether Mr. Wilkinson would be willing to serve if nominated.

The Hon. Secretary said Mr. Wilkinson was quite willing to serve last year, and had the consent of his Council to do so.

Mr. J. C. Belton (Chester) seconded the motion, which was carried unanimously.

Induction of the President-Elect.

The President said his next duty was one in which pleasure was mingled with regret, and that was to hand over the reins of office as President of the Institution to his successor, Mr. Prince. Twelve months ago he asked the members to accord him their support, and had said that with it he had no fear as to the success of his year of office. This support had been given to him; and he thought he might say that the year had been a successful one. The attendances at the meetings had been excellent, and the membership roll had slightly increased. His best wish to his successor was that the same help and sympathy might be accorded to him as he (Mr. Brearley) had enjoyed. He could not give up office without testifying to the painstaking manner in which the secretarial duties had been carried out by Mr. Kendrick. He felt that his term of office would not have been nearly so successful if it had not been for that gentleman's assiduous attention to his duties; and he rejoiced to know that he was continuing in office for another year, because the new President would at least be assured of the assistance of a good Secretary.

Mr. W. Prince (Stoke-upon-Trent) then took the chair, and met with a very hearty reception from the members.

The President said the first duty that devolved upon him was to ask the members to pass a very hearty vote of thanks to their late President. He could quite believe Mr. Brearley when he said he parted with his office with regret, because he had had a very pleasant year. He had inaugurated two special movements—one with regard to the annual reports and the reports of the district meetings; and, secondly, the Manchester Gas Exhibition, which he trusted would be a great success. A very active Committee were at work seeing to all the details; and he looked forward to the exhibition being something more than they had been treated to in the past in the shape of gas exhibitions, and that the whole district would be permitted to see the very best that the industry could produce for the lighting and heating of its dwellings. They had also to thank Mr. Brearley for their introduction to the works of the Salford Corporation.

The resolution was carried unanimously.

Mr. Brearley thanked the members for their kind vote. He said the only thing he wished to refer to was the exhibition. He had been delighted to see the enthusiasm and vigour that their esteemed and venerable friend Mr. Thomas Newbigging had displayed in the matter. This gentleman had, with reluctance, taken up the duties of President of the Exhibition Committee; and he was going about the work in no half-hearted manner. He (Mr. Brearley) was quite sure that in such hands it would be very great success.

The President then proceeded to deliver his

INAUGURAL ADDRESS.

Gentlemen,—It is customary for your President to preface his presidential address by thanking the members of our Institution for the high honour they have conferred upon him. Permit me then to express my deep appreciation of this mark of your favour

to myself, and to the district that I am privileged to represent. While not unmindful of all my obligations to my fellow-members of the Manchester Institution, and the responsibilities of your President, I must candidly confess that I enter upon my duties with every confidence that the year's working will be satisfactory, if the support I obtain is proportionate to the numerical strength of our Institution and the eminence of the gentlemen who form your Committee.

At the outset of my address, permit me to express my belief that at no period in the history of gas manufacture has Science played so important a part as it is doing to-day, in the devising and application of time and labour saving machinery—now so very necessary in each process—from the deposition of coal upon the works to its removal in the form of coke and other bye-products for the market. Moreover, the same opinion holds good when we consider the far-reaching results of the labours of those engaged in laboratory practice—all alike animated by the one desire for greater purity, usefulness, and the cheapening of our commodity.

I notice from reports issued by the Home Office that the output of coal in the United Kingdom for 1905 was 236,128,936 tons; that 14,295,602 tons, or over 6 per cent., of the total output was gas coals; that 149,791,676,000 cubic feet of gas were made; and that the capital employed was £121,241,335. These figures clearly indicate the extent of our business.

CARBONIZING COAL.

It would serve no useful purpose to enumerate at any length the various methods employed in converting this great mass of coal to a gaseous state. But, in passing, special attention ought to be called to the most recent form of retorting. In dealing with this matter one may refer to the excellent paper, "On the Working of the Vertical Retort," read by Herr Körting, and to the experiences of Mr. Brockway as described by him in his Presidential Address at the Eastern Counties Association annual meeting. Both these addresses—based upon actual experience—must be of great value to any who may be considering the expediency of adopting some such form of extension. I am in a position to state that other valuable contributions on this subject will be presented to you during the course of the year.

RETORT-HOUSE GOVERNORS.

In connection with carbonizing, I wish to make allusion to two valuable adjuncts to retort-settings—the "Retort-house Governor" and the "Tar-Tower." The retort-house governor recently designed by Mr. Charles Carpenter, of London, and introduced into many works, is of simple construction, and I find it of the greatest utility. I have one fixed on the foul main at the end of a bench of five arches, each containing eight through retorts 22 inches by 16 inches, oval ⌂ section. This governor prevents over-exhausting, and at the same time so governs the pull of the exhauster that a constant vacuum (as predetermined by the load on the top of the governor bell) is maintained in the hydraulic main. By this arrangement, I am enabled to work with a minimum of seal, and at the same time the pulsations of the exhauster are regulated by the governor. The result is perfect distilling conditions in the retorts, with consequent increase in the make of gas per ton of coal carbonized, and maintenance of uniform candle power.

I can strongly advise those who have not already adopted this governor to give the matter very close attention. The control of the vacuum in the hydraulic main was, up to quite recently, effected from the exhauster, between which and the benches great variations of vacuum can arise. Control should be at the point where it has the greatest effect on the quantity and quality of the gas—viz., close to the retorts; and this can only be obtained by a governor on the foul main close to the hydraulic main.

At Stoke-upon-Trent, the vacuum at the exhauster inlet is 1½ inches; and this is reduced by the governor to 2-10ths inch on the retort side. This pull can, however, be varied at will by simply altering the governor load.

TAR-TOWERS.

It has been stated by some authorities that we work in cycles, and that in a more general adoption of the tar-tower we are simply improving on the idea presented in an admirable paper on the "Evolution of the Hydraulic Main," by the late William Carr. This paper was read at the meeting of the Institution in London in the year 1899; the distinctive feature being the removal of the tar as it was deposited in the hydraulic main. Too much cannot be said in commendation of the adoption of such an adjunct to any setting of retorts working with high heats. By the adoption of the retort-house governor in conjunction with the tar-tower, the deposition of carbon on the retorts and stopped ascension pipes will be avoided, naphthalene troubles will be reduced, and the danger arising from a pitching-up of the plant will be got rid of. I once had my plant almost entirely stopped by the pitching-up of the hydraulic main and tar-pipes. The recollection (by no means a happy one) excites my greatest sympathy for those brother managers who have similar difficulties.

NAPHTHALENE.

Now that I have introduced the subject of naphthalene into my address, I will devote a few brief passages to this almost worst of plagues. It is a regrettable fact that the Naphthalene Committee promoted by the Southern District Association of Gas Engineers has presented a final report in which they intimate that, in consequence of lack of funds, they are unable to proceed further with their investigations. Notwithstanding this, the labours of the Committee will materially assist in the elucidation of the subject. I have from time to time read their reports with much pleasure, appreciated their endeavours, and could have wished them a larger measure of success. It is to be hoped that the good work of the Committee will be recognized by the Institution, and such steps taken as may be deemed necessary for the more effectual prosecution of the work so ably begun.

At Stoke-upon-Trent, we have experienced serious difficulties for many years through the deposition of naphthalene in the distributing system, and particularly so before the introduction of either generators or regenerators into our works. That the trouble is the outcome of varying temperature, most of us are agreed; and accepting as I do this theory, I have been content to apply the readiest means for its removal immediately the trouble makes its appearance.

I am perfectly satisfied that any system introduced into our plant, in the nature of wire-drawing the gases, must very materially assist in the elimination of naphthalene. We have, however, no such system on our works; but we have adopted the principle of washing the gas as follows: A quantity of solvene to give a seal of 3 inches upon the ammoniacal liquor in the Livesey washer, is introduced. This has the effect of creating a large amount of spray or foam—thus considerably increasing the washing surface originally available; and at this stage unquestionably a disassociation of the free naphthalene from the gas commences. The cost of the same, based upon an extended period of working, is 0·07d. per 1000 cubic feet.

Subjoined is a table showing recent tests of our gas for naphthalene:—

Date, 1907.	Gas Tested and Place.	Grains per 100 Cubic Feet.	Weather Remarks.
Jan. 21 . . .	Purified gas in laboratory.	3·60	Mild.
,, 23 and 24 .	Crude gas at inlet of washer.	2·42	Freezing hard.
,, 24 and 25 .	Purified gas in laboratory.	1·43	,, ,,
,, 25 and 26 .	,, ,, ,,	1·62	,, ,, (less severe).

During these tests the temperature at the outlet of the condensers registered 40° to 43° Fahr.

PUSHING BUSINESS.

A very great deal has been stated and written on this branch of our business, and no doubt rightly so. We have entered the race with the firm conviction that gas, which has been the foremost lighting agent for many years, must not only remain so, but that it is with this addition a factor to be taken into account by those adopting power appliances. Great strides have undoubtedly been made in the supply of gas to the manufacturer for power purposes as well as to the artisan class in the form of an economical friend. As we scan the statistics so often arrayed before us, we recognize the keen competition to which we are subjected, and are impressed with the desirability of cheapening our product—particularly for power, heating, and cooking purposes. In dealing with this matter (one, to my mind, of great importance), I feel that such lines as those laid down by our esteemed friend Mr. Thomas Newbigging, in his paper "On the Price of Coal Gas" (read before this Institution in November, 1905), should, or ought to, obtain.

In Stoke-upon-Trent, our staple industry is the manufacture of china, earthenware, &c. Hence I am not exercised very much with the competition of suction-gas plants—in fact, the demand for gas-engines is very limited indeed. The total number employed at the present time is only 17, which have an annual consumption of slightly under 6 millions. These figures will be astonishing to many when they think of the veritable hive of industry in which our works are situated. But I must ask my hearers to remember that, in the methods of the trade, conservatism is a dominating characteristic. I am happy, however, to think that there appears to be a disposition to give serious consideration to the adoption of gas-firing for kilns, &c.; and important trials are now being made. The effect of this venture, if pursued to success, will have important results. It will reduce our smoke nuisance to a minimum; our atmosphere will be purer; and it will doubtless give an impetus to our business. I have prepared a table showing our growth in quinquennial periods, and from it can be traced the introduction or popularization of the gas-cooker and the prepayment gas-meter. The former are let out on a rental of 10 per cent. on cost, *plus* 20s. to cover the cost of fitting materials and fixing. The whole of the rents accruing are applied in the reduction of the "Stoves Capital Account," which I believe to be a sound financial policy. Gas-fires and other appliances of a similar character are sold at net cost; the fittings and fixing of same are free of charge. With the prepayment meter, we supply neither cooker, griller, nor fitting of any kind; neither do my Committee contemplate any alteration to this rule. One cannot pass from this subject without uttering a note of thankfulness that such a means was conceived of placing gas into the most humble home.

PUBLIC LIGHTING.

Another satisfactory feature in our business is the regaining of the lighting of our public streets, particularly in our large cities. Liverpool was, I believe, the pioneer city to awaken to the excessive cost entailed by the electric lighting of public thoroughfares

Year.	Coal Carbonized.	Gas Made.	Make per Ton of Coal Carbonized.	Gas Sold.				No. of Consumers.		No. of Stoves on Hire.	No. of Public Lamps.		Population.
				Private Lighting.	Motive Power.	Public Lighting.	Total.	Ordinary.	Automatic.		Ordinary.	Incandescents.	
				Cubic Feet.	Cubic Feet.	Cubic Feet.	Cubic Feet.						
1895	9,567	95,924,000	10,026	75,481,800	..	14,268,800	89,750,600	2500	158	151	592	..	25,900
1901	13,555	128,887,000	9,508	100,019,800	3,561,600	15,874,600	119,456,000	2458	1640	671	631	50	30,458
1906	13,183	139,702,000	10,673	103,076,200	5,329,300	17,503,200	125,908,700	2206	3163	1334	293	467	33,500

and was speedily followed by others—notably London—with the result that the electric standard has been steadily displaced. This has resulted in a more extended application of high-pressure and other forms of incandescent gas lighting; the consequent saving in cost has been enormous; and a greatly improved light is obtained. The adoption of a tried appliance for the lighting and extinguishing of street-lamps from a central or manufacturing station, is an immense boon. Light can be applied instantly at any hour throughout the area of supply, and great economy is effected by shortening the burning hours and a lengthening of the life of the chimneys and mantles—both of which are important factors meriting consideration.

GAS EXHIBITION.

It must prove a source of gratification to members of our Institution that the projected Gas Exhibition to be held during the coming autumn has met with such a hearty and liberal response from manufacturers and exhibitors. Our mission undoubtedly is to educate our consumers as to the most ready, efficient, and economical means of lighting, heating, ventilating, and labour-saving applications of gas. To this end, our Institution has very wisely decided to hold an attractive and instructive exhibition, in a centre of so many and varied industries as Manchester and its environments present. We feel assured that our efforts will be appreciated and acceptable to those we are hoping to cater for; and even though the project entails a great amount of work and anxiety, it is a duty we owe to our district, and as such it will be carried out with the sincere and pure motive of establishing our profession in its proper position.

INSTITUTION WORK.

In dealing with the work of the Council of the Institution of Gas Engineers, I can assure those gentlemen of this District Institution whom I have the honour to represent on the Council, that that body is fully alive to its responsibilities. Good results are being achieved by the various Committees, by actively pursuing policies calculated to further extend the value, usefulness, and importance of our profession. I trust the appeal for funds recently made upon all owners of gas undertakings may bear such fruit as will enable the work of investigation and research to be prosecuted more thoroughly in the future than was possible before the inauguration of this special fund. While much has been done by our Parliamentary Committee in respect of measures already existing, there is something more to be done in the nature of a frontal attack upon those departments which are responsible for the appointment of Committees whose duties are the consideration of the Gas-Works Clauses Acts (now in many instances obsolete), governing illuminating power, sulphur restrictions, &c.

ILLUMINATING POWER.

With respect to the burners for testing illuminating power, there has been an important change during the past twelve months—namely, the standardization of the "Metropolitan Argand Burner, No. 2"—a burner which has met with almost universal appreciation, because it possesses the reputation of being just and honest to consumer and producer alike. Its value can only be rightly estimated when we consider that it is applicable to so wide a range in quality as between 12 and 20 candle gas. There can be little doubt that by its more general adoption comparisons of costs will be in a large measure simplified.

SULPHUR.

It is a matter for congratulation that the long-existing obligation to keep down sulphur compounds within unreasonable limits has been removed as regards a large number of gas undertakings—the Royal Assent to such removal having been given on the 20th of July, 1906. Another Bill will be submitted to the House this year to free other undertakings. For this good office, together with much of the pioneer work connected with the elimination of iniquitous limitations, we have to thank those responsible for the administration of the Gas Companies' Protection Association.

THERMAL EFFICIENCY.

To-day one of the vital essentials in the manufacture of coal and other gases is thermal efficiency; and I am pleased to note that the Metropolitan Gas Referees are exerting themselves in the direction of introducing the best-known apparatus for the estimation of calorific values; and new conditions under which tests have to be made are in operation. When we consider the relative values of gases from this standpoint, what a wide margin there is between (say) coal gas of 650 B.Th.U. per foot and Mond gas at 120 B.Th.U. per foot.

STANDARDIZATION.

Adverting to the report of our representatives on the Engineering Standards Committee, dealing with the question of the standardization of flanges, gas-pipes, valves, &c., it appears to me that this Institution might with advantage consider the advisability of a more general standardization of gas plant. I have the conviction that the consideration of such an important matter would be likely to confer a boon upon many of our professional brethren, inasmuch as in the work of bringing plant up to present-day requirements, it would be patent to directors and committeemen alike that the proposals of the engineer were justifiable.

VENTILATION.

No doubt many of us are eagerly looking forward to the lecture to be given by Professor Vivian B. Lewes, in Dublin during the annual meeting of the Institution of Gas Engineers, on the effects of gas lighting so far as it concerns the vitiation or otherwise of the atmosphere of our houses. Much valuable information will undoubtedly be forthcoming for our guidance. I am certainly imbued with the belief that gas can and will play an important part in ventilating schemes of the future.

ASSESSMENT.

The further protection of the industry against the ever-growing rapacity of the tax assessors (who appear always to imagine us fit subjects for their plunder), has been advocated for many years. I regret, however, that no definite plan of action has been agreed upon. The subject is beset with many difficulties, but in most cases purely local in their bearing. These, however, have made the subject a vexatious one, and (as it would appear) one in which the legal fraternity cannot well be dispensed with. Subjoined is a table giving some analyses from Stoke-upon-Trent and other towns in our immediate neighbourhood (classified for purposes of privacy under letters) introduced with the object of showing how unequal the tax is applied for want of a governing principle.

When we examine the rates given in "Field's Analysis" of the 35 principal gas undertakings, we find a much greater variation existing. These 35 undertakings pay an average of 2·06d. per 1000 cubic feet of gas sold. The maximum rate is equivalent to 4·33d. per 1000 cubic feet sold; while the minimum rate equals 0·6d. These statistics prove the necessity for concerted action to secure an uniform rate of taxation, and ending those annual and quinquennial disputes.

I am of the opinion (based upon experience with different bodies of assessors) that a fixed sum per 1000 cubic feet of gas sold, or per ton of coal carbonized, would be the most equitable solution of a very knotty problem.

This subject has for many years engaged the attention of

	Gas Sold.			Rateable Value of Works, &c.			Rateable Value per 1000 Cubic Feet of Gas Sold.			Rates in the Pound.			Amount of Rates (excluding Income-Tax).			Rates Paid per 1000 Cubic Feet of Gas Sold.			Selling Price per 1000 Cubic Feet.	Percentage on the Selling Price.
	1896.	1901.	1906.	1896.	1901.	1906.	1896	1901.	1906.	1896.	1901.	1906.	1896.	1901.	1906.	1896.	1901.	1906.	1906.	1906.
	Cubic Feet.	Cubic Feet.	Cubic Feet.	£	£	£	d.	d.	d.	s. d.	s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	d.	d.	d.	s. d.	d.
A	91,029	119,456	125,908	104 1,561	104 2,090	250 2,702	4·39	4·41	5·63	0 8 7 2	1 10 7 1	1 0 8 7	3 9 4 559 7 2	9 10 8 740 4 2	37 10 0 1,159 12 2	1·48	1·51	2·28	3 0	6·33
B	50,290	73,364	80,300	1,000	1,459	1,841	4·77	4·77	5·50	6 10	7 2	7 4	341 13 4	522 16 2	675 0 8	1·63	1·71	2·02	3 3	5·20
C	95,000	140,000	134,000	2,087	2,150	2,711	5·27	3·69	4·86	7 8	8 10	9 0	800 0 4	949 11 8	1,219 19 0	2·02	1·63	2·19	2 11	6·26
D	79,724	101,096	107,000	1,570	1,570	1,570	4·72	3·72	3·52	5 8	6 6	7 9	444 16 8	510 5 0	608 7 6	1·34	1·21	1·36	3 0	3·78
E	125,758	184,799	204,217	3,480	3,480	3,480	6·64	4·52	4·09	6 6	7 1	8 10	1,131 0 0	1,232 10 0	1,537 0 0	2·16	1·60	1·80	2 6	6·00
F	262,732	338,899	352,649	4,959	4,214	4,672	4·53	2·98	3·18	7 9	8 0	9 7	1,921 11 1	1,685 16 0	2,338 18 1	1·75	1·19	1·59	2 6	5·30
G	130,102	152,470	185,417	2,532	2,754	2,786	4·67	4·33	3·61	6 6	7 1	8 5	822 16 5	975 5 9	1,172 4 7	1·52	1·53	1·52	2 4	5·43
	834,635	1,110,084	1,189,491	17,293	17,821	20,012	4·97	3·85	4·04	..	..	..	6,024 14 4	6,625 19 5	8,748 12 0	1·73	1·43	1·76	..	..

various writers and members of our profession; but that fact should not deter our Institution or the Gas Companies' Protection Association from taking such measures as would ultimately bring about effective legislation with regard thereto.

REPAYMENT OF LOANS.

Other subjects that might profitably receive the attention of our Parent Institution are the advisability or otherwise of approaching the Local Government Board with a view to securing for the future greater uniformity in the length of time allowable for the repayment of our loans. It is interesting to note in the Blue-book for 1905 relating to this department, that no less a sum than £6,250,000 was authorized to be spent on so-called public improvements during the year under review. The particular point which concerns our industry lies in the fact that this body varies its times for repayment of loans so considerably as between 8 and 60 years.

Another important item is the removal of the restriction to borrow money for the purpose of erecting water-gas plants. Surely this mode of gas manufacture has become sufficiently understood to warrant its inclusion among the various types of plant for which a lengthy period of repayment is allowed.

COMMERCIAL SECTION.

I am presuming that my hearers will consider no address from this chair complete without some allusion to our Commercial Section, and the good work achieved by this branch of ourselves. That much success has crowned the pioneer efforts of friend Meunier was evidenced in a tangible manner (so far as our own members were concerned) at the meeting held in Huddersfield in May last year. But the most gratifying feature lies in the fact that most other kindred Associations see the wise policy of such a section and are emulating our example. There can be no doubt that considerable financial advantage must accrue to the employers of members from the policy advocated—that is, to secure the best possible prices for the whole of our bye-products. This, of itself, is enough to justify its existence. Moreover, the fact is that working costs are regularly compared and discussed at our meetings, and difficulties as they arise to individual members (sufficiently interesting for the Institution to take cognizance of) are all duly considered.

In conclusion, Gentlemen, let me say that only a few of the salient features connected with our important business have been touched upon in this address. The time at my disposal prohibits a longer or wider range of subjects being dealt with. I cannot but believe that the progress and development of the gas industry is very largely due to the healthy stimulus it has received from its competitor and rival the electric light, for were there no grit in the grindstone the axe would be a long time in grinding, and only when our profession was threatened did we rise to the occasion and prove that gas, as an illuminant, occupied the foremost place. But we must not—nay, we dare not—remain stationary. The philosophy of to-day is the common-sense of to-morrow; and only by a consistent and persistent application on our part to the work of research can we hope to continue in the proud position which we occupy to-day.

Mr. W. W. Hutchinson (Barnsley) proposed a hearty vote of thanks to the President for his admirable address, which was full of information, and reflected great credit on him.

Mr. J. G. Newbigging (Manchester), in seconding, said the address dealt with a number of matters which were of great interest to the members, and was a very excellent one throughout. They had been favoured during recent years with up-to-date and very excellent addresses from their Presidents; and Mr. Prince had that day maintained the standard. He had taken office in an important year—namely, the year of the exhibition in Manchester, which they hoped to make a great success, and thereby further their interests.

Mr. S. Glover (St. Helens) supported the resolution; remarking that the address made them wonder why they had been so short of subjects to discuss at their meetings. The President had brought forward a contribution bristling with questions, many of them having two sides.

Mr. J. H. Brearley (Longwood) said it gave him great pleasure to put the resolution. He had listened to the address with delight; and he was quite sure that all that had been said with regard to it was fully justified. Perhaps they might tempt Mr. Glover out of his seclusion at St. Helens, to deal with some of the points he had referred to, and not leave them in a semi-anticipatory state. They were all very anxious to know what the other side of a question was; and he did not think they should be content until Mr. Glover came forward and tackled some of them.

The resolution was carried unanimously.

The President thanked the members, and said he was sure there ought to be no dearth of papers, though he must admit that his address had troubled him in the making. But he felt, like many others had felt in the past, that he had not been able to do justice to himself. It had been a labour of love on his part to do what he had done.

The Hon. Secretary said Mr. Glover had pointed a moral and Mr. Brearley had followed it up. He should like to announce that he had still room for just one paper in May, and another for the November meeting.

EXPERIENCES IN COMPETITION FOR POWER.

The adjourned discussion on Mr. G. E. Stevenson's paper on the above subject, read at the previous meeting, was then proceeded with.

Mr. G. E. Stevenson (Long Eaton) said he was afraid the time which had elapsed since his paper was read might have somewhat cooled the desire to discuss it. He was very uncertain whether he should be able to attend this meeting; and, as a matter of fact, he had not looked at the paper since last November. With the exception of various letters which he had received from different parts of the country, and some slight attention that he had paid to papers devoted to suction-gas plant, &c., it had almost escaped his notice. He might remind the members that he did not pose as any authority on power. He was led into giving the paper simply because he was very much indebted to their Commercial Section. The chief points in the paper were with regard to the competition of suction gas, and whether what was claimed for it by the makers was true and obtained in actual practice, or whether the statements should be modified. He happened to have had about three years' experience with those people; and he had given his views. He thought in winding up the previous discussion he said that the main point was, Was suction gas a serious competitor? If so, could it be met, and what was the best way to meet it? Of course, in this there were many side issues involved. With some members, the power business was not worth attention; and the whole question of differential prices and the quality of gas must necessarily come into consideration. These, he thought, were the main points of his paper.

Mr. T. Duxbury (Oldham) said that they were much indebted to Mr. Stevenson for bringing forward the question of suction gas. Whenever they had a competitor, he thought it was their duty to try and meet it fairly and squarely. They had had many competitors in the past; but they had all gone to the wall, and it was his candid belief that this would be the fate of suction gas. He was afraid that its competitive powers were being too greatly magnified, and that they were looking too much on the serious side of the question. He, for one, did not believe half that the makers of suction-gas plant wanted them to believe. It was well known that many producer gases of various kinds had come forward—for instance, Mond gas, Dowson gas, and acetylene gas, to say nothing of electricity. These had all come to revolutionize the coal gas industry; but this state of things had not arrived yet. The fate that had been experienced by all their other competitors would be shared by suction gas. At the same time, they ought to do all they could to bring their gas down to such a price that it would hold its own with suction gas, though he did not think for one moment that such a price as 1s. or 1s. 6d. per 1000 cubic feet should be considered. If they produced a good coal gas at 2s. per 1000 cubic feet, there would be little fear of their being knocked out of the market by suction-gas plant. The makers of such plant took care to omit several items of expenditure which ought not to be excluded. Though he said 2s. was a reasonable figure, if they could follow people who could afford to supply gas at a lower figure, it was their duty to do so. He entirely agreed with their old friend Mr. Thomas Newbigging, when he said in his paper at Stockport fifteen months ago, that they ought not to rob their lighting consumers for the sake of giving their gas away to power users. They had decided not to do this in his town. In Oldham, they had 350 gas-engines; and their price for gas all round was 1s. 9d. to 2s. 2d. per 1000 cubic feet. They had no differential charge for power purposes. Out of these 350 gas-engines, which consumed only 60 million cubic feet per annum, 300 were below 20-horse power. There were 85 consumers of less than 7000 cubic feet a quarter with gas-engines, 50 who used less than 13,000 feet, 50 who used less than 25,000 feet, and another 50 who used less than 50,000 feet per quarter. There had been an attempt to frighten them into supplying gas at 1s. or 1s. 6d. per 1000 cubic feet by shaking suction gas in front of them. But they had not done so; and although there were some suction-gas plants going into their district, they had decided that, if they had to bring their gas down to 1s., they could not compete with them. He did not believe in giving his gas away to the power consumer, and making the lighting consumer pay for it. He had one consumer who this year would probably take 100 million cubic feet; and the firm had their gas at 1s. 9d. He took it that it would be most unfair if they were to supply the 350 power-gas users at a lower figure than this one consumer, who used 50 per cent. more gas than they did. On this ground, he thought they ought not to be frightened into reducing their price down to the ridiculous figure of 1s. or 1s. 6d. per 1000 cubic feet, when their ordinary price was about 2s. Gas-engine users naturally would do their utmost to prevail upon them to supply gas for the purpose at a low figure; and when once they had brought their gas down to 1s. 6d. per 1000 feet, there was no chance, even if the suction gas failed, of putting the price up again to what it was originally. He was confident that, if they did their utmost to bring down the general price of gas, and compete with suction gas as well as they could, and not get into a panic about it, they would eventually win and hold the market. Personally, he did not believe in differential rates of any kind—or, at any rate, differentiation between lighting gas and power gas. If they gave a differential rate at all, it ought to be to the larger consumer of gas, because it involved less collection, and

there was less expense connected with it in every way. At the last meeting, their ex-President, Mr. Meunier, spoke very strongly, and Mr. Stevenson supported him, as to these differential rates; and they all knew that Mr. Meunier had a strong opinion with regard to supplying gas very cheaply for certain purposes. Having had charge of an electric light station, he believed Mr. Meunier was stricken with the rate fever of the electricians, and that he had the electricians on his mind. They had nothing to learn from the electricians; on the contrary, the latter had something to learn from their methods of charging. He believed with Mr. Newbigging that, if they had anything to give away, they ought certainly to consider the lighting consumer, who had been, and was yet, practically the backbone of the gas business. Mr. Stevenson had given many useful suggestions in his paper; and they were extremely indebted to him for them, because they would assist them in arguing the point with would-be suction-gas users when they came to discuss the matter. Mr. Stevenson had mentioned the question of the emergency supply. It seemed to him unfair they should have to put on an emergency supply for every fickle competitor who came forward. They had no reliance upon themselves, and therefore they had to place a meter there as a stand-by for any failure. He agreed with what Mr. Whatmough said at the last meeting—that this was a subject for the Institution of Gas Engineers to take up. It was not fair that they should have to lay on a stand-by, and leave their capital there, for no consumption, simply because they were compelled to do so by Act of Parliament. He wished to thank Mr. Stevenson for his splendid paper; but, at the same time, he should have liked it better if he had not treated the matter in so serious a way as to lead them to believe that they ought to bring down the price of gas to 1s. per 1000 cubic feet to compete with suction gas. It was all very well for gas-engine makers to argue the point, and try to show that they ought to let them have gas at 1s., because it was a matter of business with them; but personally he really believed that, if they persevered with their gas manufacture as they had done during the last ten or fifteen years, eventually suction gas would not be the great competitor it was at present imagined to be.

Mr. S. MEUNIER (Stockport) said he did not know whether Mr. Duxbury was trying to "bell the cat" or to get him on his legs, but he had certainly succeeded in doing this, whether or not he wished it. He had certainly pretty freely stated at the last meeting his opinions with regard to suction gas and the way to meet it; and they all knew what his ideas were with regard to the prices to be charged for gas, whether used for lighting or for heating. His views on this subject would be gathered from his presidential address, which he took a great deal of pains to compile. He wished to draw Mr. Duxbury's attention to one point. That gentleman had said he did not see why the lighting consumer should be robbed for the sake of the gas-engine consumer. He (Mr. Meunier) was prepared to admit that he had learned his lesson from the electrical side of his town; and he had tried to arrive at some differentiation in cost between the lighting consumers of various grades and the power consumers of various grades. In this way he arrived at his fetish of the hour-load, because nothing that he had heard showed the contrary of his idea, which was that this load was the one dominant factor in the cost of supply. Mr. Duxbury himself had proved it when he made a special appeal to the Institution of Gas Engineers to move in the matter of emergency supply. He distinctly objected to having this capital spent upon plant which was earning no money. This was the very fundamental principle of the matter. Why should they do so? He was making nothing out of it, in any shape or form. Would not the same thing apply to the very large consumer of 100 million cubic feet a year, to whom Mr. Duxbury referred? He said this consumer should have his gas at a very low figure, because he needed less attention and book-keeping. He (Mr. Meunier) should like to know for how many hours this consumer burnt, and what was the size of the plant he required to have installed. When did he burn the gas? Was it in the winter or all the year round? On the emergency supply, they were earning nothing; on the contrary, they were paying something out of pocket. With the 100 million cubic feet consumer, it might be that he was burning, on an average, one hour per day, which meant a large number of lights and heavy consumption for one hour, and a very big plant. How was this brought about? It was consuming gas for lighting purposes for three or four months, and then nothing for the remainder of the year. Was not this plant standing idle earning no money? He was still of his old opinion, and he had tried in every way to differentiate between the paying and the non-paying consumer. Now he would take the other side of the picture. Why should a man who burnt gas for 80 hours a week regularly and constantly be charged the same price as a man who only burnt five hours a week, taking exactly the same quantity of gas? Where did the difference in cost come in? If they had taken the trouble, as he had done, to work it out, they would very soon see. He endeavoured in his address to show that with a heavy lighting consumer, burning an hour a day, the cost on the plant amounted to 2s. to 2s. 6d. per 1000 cubic feet, while the standing charges were an infinitesimal decimal point. But when they came to take the small consumer, the lighting consumer—and there were no doubt plenty of them in Oldham—where did they find the difference? His cost of gas per 1000 cubic feet consumed was small compared with the great cotton-mills; but the standing charges were very heavy, because the book-keeping required amounted to so much more per consumer per annum, and this when it was divided among the consumers of 7000 cubic feet a year amounted to as much as 15d. per 1000 cubic feet. How were they robbing the consumer? They were making it out of the man who used gas for industrial purposes. Personally, he had never been afraid of suction gas, nor an advocate of coming down to such a figure as 10d. or 1s. per 1000 cubic feet. He did not think they had ever heard him say so. His point had always been that at 1s. 6d. and, in some cases, 1s. 9d., suction gas could be competed with successfully; and he was still of that opinion. But when it came to a question of an all-round price, he must say he did not believe in it. What he meant by this was that in an industrial town, or where it was not simply the question of a gas-engine user, though he did take 25 million cubic feet a year out of their department, there were others. There was the heating, which meant a great deal; and when they served one they must serve the others. Those were the consumers out of whom they made a heavy profit per 1000 cubic feet. Was it quite fair that they should rob them for the benefit of the lighting consumers? Why should they rob the man who was taking his gas for so many hours a week and so many weeks in a year, for the sake of the man who was going to burn it for an hour a day, and that at a busy time of the year, exactly when everybody else wanted it? Mr. Duxbury, of course, had to deal with some heavy lighting consumers; and he did not have very much in the way of heating or for manufacturing purposes. His gas-engine trade must be small, because the industry was such that it required very high powers. He thought probably Mr. Duxbury could tell them exactly that very few of the mills which he had to light up had less than 2000 H.P. Therefore, the competition of suction gas would not come in there. But he had a heavy lighting load; and, though he (Mr. Meunier) appreciated his point with regard to the saving in labour by having a large account coming in without very much trouble, he differed from him when he said the big consumers ought to be considered, because he was certain they were getting gas at considerably less than cost price—as he had said before, at the expense of the small ones. It was done in a town like his at the expense of the goose which laid the golden eggs. He hoped that Mr. Duxbury would excuse him for falling foul of him; but he had tempted him to rise and say what he had said.

The HON. SECRETARY said they had had one point of view from Mr. Duxbury and another from Mr. Meunier; but he was one of those who came about half way between them. He wished to thank Mr. Stevenson for his paper, which contained a great many useful hints. They had had during the discussion the efforts of some of their friends to meet competition described as "feverish." If, however, some of them had been too hasty, others had been too dilatory; and while he could not agree with either extreme, his Company had (despite the warnings of their esteemed friend Mr. Thomas Newbigging) found the sliding-scale adopted by them to be to the mutual benefit of themselves and their consumers. The main questions before them were, What was the prohibitive price to keep out suction plants, and how soon could they come to it? Mr. Stevenson, in his sliding-scale, did not come near his minimum price of 1s. 6d., at which figure he said business was refused. Mr. Whatmough, according to the report of the discussion at the last meeting of the Institution, said that 2s. to 2s. 3d. would meet it. Mr. Robert Watson, who had evidently gone very exhaustively into the question, said 1s. 8d. to 1s. 9d., or from 2d. to 3d. in excess of what Mr. Stevenson said he lost business at; while Mr. Dugald Clerk stated in his address to the North of England Association that the price must be 1s. "Gas and Oil Power," in their issue of the present month, said the price must be 1s., and even 9d., to compete; and they called attention to the cost of Widnes and Sheffield gas—evidently with the intention of using these isolated and fortunately-situated undertakings as a lever for forcing down prices in other towns. The paper said that when the price reached 1s., there would be no use for suction plants. If, however, the figures of their own friends were reliable, they had no chance even with gas at 1s. 6d. or 1s. 9d. To many undertakings even this figure was out of all reason, if all classes of consumers were dealt with fairly. He noticed in "Gas and Oil Power" there was an extract from the "Standard" articles by Professor Burstall, in which he repeated the old cry of one B.H.P. at one-tenth of a penny; and then he went on to say: "The remarkable success of the suction plant seems likely to have a profound influence on the whole question of the generation of power. Up to the present, it had almost been assumed that the wholesale production of power in a central station and its distribution by electrical mains to the motors, constitute the cheapest possible means by which power can be obtained. On this supposition, enormous sums have been expended both by private companies and municipal authorities in the provision of large power stations and the laying down of expensive tracks of cables, together with the provision of motors to be hired out for the use of customers. Power has been sold at prices varying from about 0·6d. per H.P. up to about 1·5d., according to the locality. Comparison of these costs with that which can be obtained from the suction producer will at once show the utter impossibility of any competition from a central source of supply; and as the greater part of manufacturers require power smaller than 100 H.P. in a single engine, it is only reasonable to suppose that, as the suction plants become better known, they will to a very large extent supersede either electrical motors or engines driven with illuminating gas; and so say all of us." This paragraph interested them in two ways, as it showed a determination

to supersede both electrical and town gas driving; and while doing them a good turn by opening out the excessive cost of electrical driving, at the same time it did them no good in the last sentence. What were they to do to combat these figures? To state them in a discussion at a meeting of this description would not help them much, as they rarely went beyond the technical papers. But if they were to get (say) Mr. Watson's statements of the case published in such a paper as the "Standard" or the Engineering Supplement of "The Times," everyone would read them, and some benefit to the industry would accrue. It seemed to him that they were asleep. They had become so used to having no competitor that they had not realized, except in isolated cases, the seriousness of the position; and the sooner they set about publishing broadcast the opposite side of the case, the better it would be for all the undertakings they represented. He thought that the Institution should appoint someone to write a series of articles on the advantage of town-gas driving, which any enterprising newspaper would no doubt publish. The day had gone by when they could wait for business to come to them; and they must follow the methods of their American friends, and look for it. He was not in favour of panic prices for gas, as such a policy would only react on themselves, and bear unfairly on the lighting consumers, who were the back-bone of their business. But a minimum figure could be found at which it would pay them to supply for long-hour loads by adopting some such method of calculation as suggested by Mr. Meunier in his Presidential Address in 1905, but modified considerably, as he was of opinion that the prices arrived at in his figures were of the panicky order, that insufficient margins had been allowed for in his capital charges, and that the allocation of his establishment charges needed considerable revision. As he had pointed out in his remarks on Mr. Newbigging's paper read in November, 1905, further experience of long-hour loads for manufacturing purposes had only proved the necessity of these corrections; and they were selling good quantities of gas at prices considerably higher than Mr. Stevenson's 1s. 6d. Turning again to "Gas and Oil Power," there had been published ever since the first issue a special table of the gas and power and light in various towns. Under Manchester, it stated that the cost per B.H.P. for electricity, at 1½d. per unit, was 1·23d.; for town gas, at 2s. per 1000 cubic feet, 0·43d.; and for suction gas, with anthracite at 22s. 3d. per ton, it was 0·119d. He had not checked all the figures in the table; but as Manchester gas was 1s. 9d. per 1000 cubic feet, and anthracite had been quoted to him at 32s. 6d. per ton delivered, the figures were evidently out of date, and required revision, when the Manchester figures became 0·38d. per B.H.P. for town gas, and 0·174d. for suction gas. There was a footnote which called attention to the advance in the cost of anthracite; but it would be much better if the table itself were corrected.

Mr. BREARLEY said, with reference to Mr. Kendrick's final remarks respecting the table published in "Gas and Oil Power," he (Mr. Brearley) wrote to that paper seven months ago, pointing out that their table needed revision respecting the Huddersfield price for power, which had been reduced to 1s. 6d., though it still stood in the table at 2s. 1½d. It was apparent that the magazine had had a large number of these tables printed, and that the time of revision was by no means often. It would not be a bad plan for the members of the Institution to point out similar discrepancies in their own cases, and then they could have the table modified, because at present it was entirely misleading, and injurious to them as gas engineers.

Mr. A. BOTTELEY (Leek) said he had had some little experience of producer plant. Their own electricity works at the present time were taking some 6 million cubic feet of gas from them. They had 400 H.P., and were supplied with gas at 1s. 4½d. per 1000 cubic feet. They had been seriously contemplating, during the last few months, putting their own producer plant down. He had gone into the question with the Gas Committee, and was very much afraid that, in order to compete with the figures he had seen, they would have to reduce their price to 1s. 3d. They had also in the town a suction-gas plant of 48 H.P., and he was assured by a manufacturer that he was saving 50 per cent. on his gas, which he used to obtain at 2s. per 1000 cubic feet.

Mr. STEVENSON, in reply, thanked the members for their kindly reception of his first effort at a paper, with all its imperfections. The discussion had been to him a very interesting one, and he would endeavour briefly to reply to it in the order of the speakers. The first criticism came from Mr. Tooley, of Manchester, who expressed much sympathy with him, and suggested that he had misdirected his energies, and could have better employed his time in other directions. He (the speaker) was afraid that the chief difference between Mr. Tooley and himself was that he had to sell his gas and Mr. Tooley did not. In Long Eaton, he had to ask for every bit of business, whether it was lighting or power; and the power business he had to see to personally. He had been very much struck by an article in the "Financial Times," giving tips to the conductors of the electricity undertakings in London, and advising the engineers to be in touch with all the customers personally, and not to leave things to canvassers. If Mr. Tooley could come to Long Eaton for a holiday for a week or a fortnight, he thought he could prove to him that his (Mr. Stevenson's) efforts had not been misdirected, for if ever there was a chance of getting a cooker in, they had one there; but if they could not educate the people in the use of the cooker, it came out. They had no dead capital. He thought that he was the first to follow the records of these cookers, because he had for some years been of opinion that much capital had been thrown away in a number of towns. Many a user of a slot meter had said that he must have a cooker, when he did not, in fact, use it. He believed he was the first in the country to send round a qualified lady lecturer to every house where cookers were used, and this was six years ago. It might be merely a coincidence that the Gaslight and Coke Company were now doing the same thing. He could assure Mr. Tooley that his efforts had not been misdirected in this matter. With regard to gas-fires, it was all very well to talk, but they were face to face with the fact that with gas-fires there was a very limited business. He did not know how it was in Manchester. Probably there they had differential prices for fires; but unless they had, they were certainly not going to have a very large volume of business. He was much obliged to Mr. Tooley for his sympathy, but he really did not need it. With reference to Mr. Mottram, he took very cheerful views, and in some respects he agreed with him (Mr. Stevenson). He evidently thought that half-a-loaf was better than no bread. Mr. Whatmough had said he would not like it to go forth from the meeting that it was necessary to reduce the price to 1s. 6d. to meet the competition; and he thought 2s. was quite low enough. But this was all a question of circumstances. Throughout the discussion, they ought to bear in mind the size of the plant, the number of hours it was running, and the purpose for which it was used. This would ultimately determine whether or not suction gas really paid. The circumstances varied very considerably. He must say he had no sympathy with people at places like Leicester and Nottingham, and those who had come right away from 1s. 6d. per 1000 cubic feet for small engines. Though it was very difficult to think that unbusinesslike practices should prevail in Birmingham, yet to him it seemed absurd to supply gas at 1s. 6d., because if they had electricity at ½d. or ¾d. per unit it was cheaper. Mr. Watson had stated his experiences with regard to Doncaster, and had given the tests of the Royal Agricultural Society at the Glasgow show. The great mistake that suction-gas people made—of course, it was a mistake made purposely—was that they said the cost was 10 to 20 B.H.P. for 1d., or whatever their imagination went to. This was only half the tale. It was quite wrong to say that one could get even 10 B.H.P. for 1d., because if the tests made at the Society's show at Derby (by Captain Sankey and Professor Dalby) were taken, and the consumption of coal per brake horse power were looked at, it was found that, working at full load, it came to 1¼ lbs., and on the half load the average was 1·69 lbs.; so that when they saw the big 1d. at the railway sidings they would know that it was not all the tale. It was like that which always obtained with water gas. They put a very large value for reflex advantages, and that sort of thing; but, as a matter of fact, the competition was such that it required careful looking into. He thought Mr. Watson's figure for the cost of the plant per brake power was too high; and therefore the capital charges would be rather less than he had stated. With regard to labour, he had not put on enough for it. He (Mr. Stevenson) did not propose to go into these delicate calculations, because it was more with the idea of looking at the matter from the commercial than from the severely technical point of view that he had submitted his paper. Mr. Watson thought they could compete very favourably with gas at 1s. 8d. to 1s. 9d. per 1000 cubic feet; but there was a good deal in gas which could be put down to what Mr. Kruger called "moral and intellectual damages." There was very much more satisfaction in the use of town gas. He had already explained that his price was not 1s. 6d. for any size. Consumers had to use 1½ million cubic feet a year before they could get the gas at 1s. 6d. In his opinion, differential rates were bound to come about. He was very much struck with the President's address, where he said that conservatism was a dominating characteristic of the gas business; and then he added that the philosophy of to-day was the common sense of to-morrow. This, he thought, would hold good with regard to differential prices. In framing his price for gas, he worked it out carefully to see where he was the most hit—where competition was the keenest. He had not the least doubt that his eighteenpenny consumers paid him better than any part of his business. They had a 15 to 20 hour load. There was no cost upon it, and there was no capital expenditure as compared with slot meters, with all their attendant outlay. At any rate, he knew which he would sooner have. The reduction in his price had brought him a large volume of business, which was paying him well. Mr. Duxbury had stated that all their competitors had gone to the wall. This was rather news to him, because he found that in most big towns the cream of the lighting department was swallowed up by electricity. From his observations during the short time he had been in the gas business, it seemed to him that wherever there was a big electricity supply the larger consumers went in for it. Mr. Duxbury seemed to be of opinion that they had magnified the competition; but he did not think this was the case. Even if they had done so, was it not better to face the thing, and try to conduct their business on commercial lines, so that they might be able to meet it? Did it not clearly point out the trend of their present industry—namely, that they had to aim at bringing the cost of the gas into the holder as low as possible, getting the utmost value out of their residuals, and making their power load more equal to the load-factor of their works? There was much to learn from the electrical people; and he entirely agreed with Mr. Newbigging when he suggested that every member should work out his costs upon this basis. It was rather a formidable undertaking for some of them; but he could assure them that it would reveal side-lights which would surprise them.

He could understand Mr. Duxbury not wanting to reduce his price at Oldham, because there they had mostly small gas-engines. He said that many were under 20 H.P.; and, of course, they were out of court for suction gas. He had alluded to the "emergency" supply; and it was a very great hardship to have to supply gas for emergencies. But at the same time his practice now was to strike a full blow, and to have some excuse for not coupling up till they were in the worst plight, and then dictate his own terms. Mr. Kendrick had referred to Mr. Burstall's remarks; but with regard to them, he (Mr. Stevenson) would merely be repeating what he had said formerly—namely, that he had only told half the tale. It was a surprising thing to him that such a statement should go forth, because it was really not half the truth. Mr. Botteley said he was selling gas at 1s. 4½d. per 1000 cubic feet; but he did not say whether he could afford to sell it at this price. He (Mr. Stevenson) could in his own case; but it was not everyone who could do so. He could point to places where they were selling gas at 1s. 6d. at a loss. He could afford to do it, because his cost into the holder was 8d. per 1000 cubic feet. What would be thought of a supplier of electricity selling at less than ¾d. per unit, when the cost was ¾d., the distribution another ¼d., and interest and capital more than 1d. ?

SOME NOTES ON HIGH VERSUS LOW GRADE GAS.

Mr. ALLEN (Liverpool) read the following summary of his paper presented at the previous meeting, when the author was absent, owing to indisposition.

The introduction referred to the general movement in a downward direction in respect of illuminating power, so that gas could be sold at a reduced price.

It was stated that this policy was inaugurated before incandescent gas lighting was generally accepted as a practical success; but it was admitted that the promoters had faith in that system, and therefore strongly advocated a reduction in the standard of illuminating power. It was pointed out, however, that in the interval between the date of such reduction and the general acceptance of incandescent gas lighting, many customers went over to the rival illuminant (electricity), but that the gas industry reinforced by its ally (incandescent gas), then fully equipped, had not only rallied in the fight but turned an impending defeat into a glorious victory.

The great advantage of Dr. Auer's invention is that it enables very great illumination to be obtained from very low-grade gas; the improvements not being a matter of percentages but of geometric progression. Therefore the advantage gained by the use of a low-grade gas in an incandescent burner as against a high-grade gas in a flat-flame burner, is enormous.

The question dealt with in the paper, however, was the comparative values of high and low grade gases for lighting and heating purposes in Liverpool—the illuminating power being 20 candles and 16 candles respectively as tested in a flat-flame burner.

In respect to lighting, it was stated that experiments were made at the Garston works, which showed that the low-grade gas was less efficient than the high-grade gas when used in an incandescent. burner, by 14·94 per cent., and that the cost of light per candle per 1000 cubic feet, allowing a reduction of 2d. in the price, was—

20-candle gas.	0·4016d.
16 ,, ...	0·4400

The net increased cost of light given by the low-grade gas being 9 per cent.

Another table shows the result of experiments made at the Linacre works by which the Garston results were confirmed. The other tests of still lower grade gases pointed in the same direction.

The conclusion is drawn that it would not be in the interests of the consumer of gas for lighting purposes—whether in flat-flame or incandescent burners—to reduce the quality from 20 to 16 candles.

As regards heating power, a slight gain of about 2½ per cent. would accrue to the consumer by the change to low-grade gas; but as the bulk of gas in Liverpool is used for lighting purposes, the balance is in favour of retaining the present standard.

The author calls special attention to the fact that his paper has sole reference to Liverpool, and he declines to dictate to those in charge of the gas supply of other towns.

Discussion.

Mr. R. G. SHADBOLT (Grantham) said that in an early part of his paper Mr. Allen remarked that the incandescent burner used with regard to the first set of tests was a Welsbach "C" burner, rated to 3 cubic feet per hour, and the air supply was regulated to give the best results in each case. He should like to ask whether this practice had been followed throughout the tests with all the grades of gas.

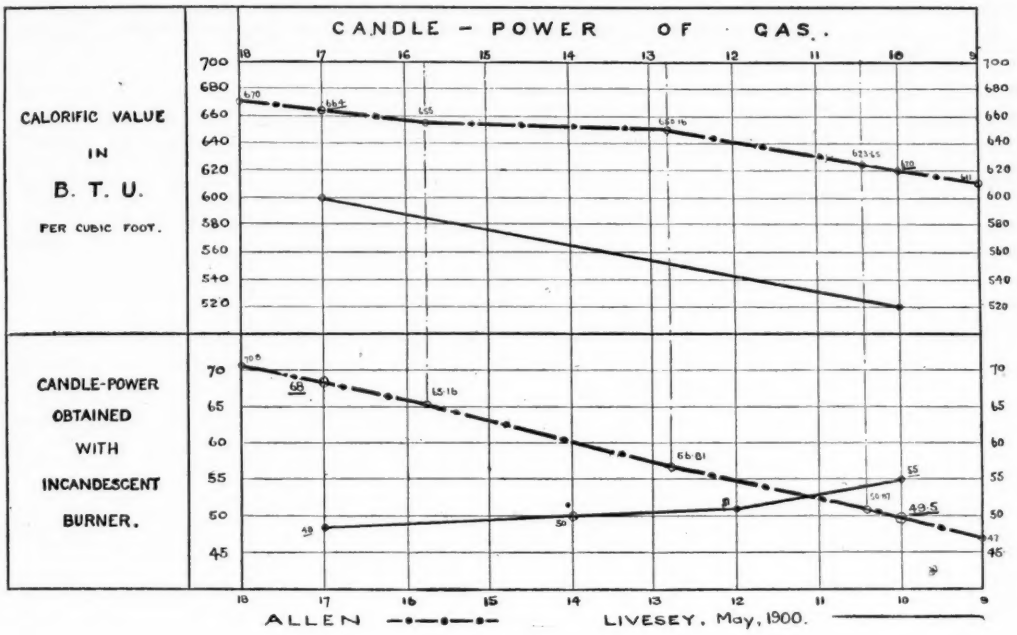
Mr. ALLEN said that was so.

Mr. SHADBOLT remarked that the *crux* of the whole question, of course, was, as Mr. Allen very tritely put it, the suitability of their commodity to the best interests of the consumer. On this point, they would all be agreed to begin with. He would pass over the exceptional difficulty just admitted by Mr. Allen with regard to the comparative cost of making 20-candle gas. The comparative value of lights which he gave was simply an exercise in proportion—it was nothing more and nothing less; and it might mean anything or nothing. He thought in the arbitrary standard of 3 cubic feet per hour, to which he had alluded, there was disclosed a mistake that vitiated the whole of the tests that followed. Taking the second set of tests, they ranged practically over different grades of gas from 20 candles tested with the argand burner down to 10 candles as tested by the argand burner. There they had a big range over which these tests extended; and yet with one identical burner, which was nominally, he supposed, to consume 4 cubic feet an hour of 16-candle gas, they had an arbitrary standard of 3 feet per hour both with the 20-candle and the 16-candle gas, and merely with an adjustment of air to get the best results obtainable with a fixed standard of gas supply and with a fixed mantle. These were not results which would give the proper value of the illuminating power obtainable from the gas used as it ought to be consumed in an incandescent burner. To simply fix the consumption of gas and regulate the air supply, seemed to be as rational as it would be to consume 4 cubic feet in a "C" burner, take a photometrical test, next reduce the consumption to 2 cubic feet and adjust the air supply, and then expect to get half the amount of light. This was the *crux* of the question—not only regulating the supply to get the best consumption of gas, but adopting the shape and size of flame to the mantle. Taking the principle of intensified lighting as at present in vogue, they went up to very high pressures, simply to get the added volume of air in the gas used. With the ordinary "C" burner, it might be taken as a general rule that there were 4 to 4½ volumes of air to 1 of gas. The quality of the gas had nothing to do with these proportions—it was the injectors formed by the jet. By increasing the increment of air from 4 to 5, one reduced the length of the flame, and was able to consume more gas in a given size of flame. The photometrical duty would be a higher duty, but only in the gas consumed; so that one got from 20 candles per foot per hour up to 40 candles with intensified lighting, not because the quality of the gas was altered, but because means—mechanical or otherwise—were taken for introducing a larger proportion of air as against the proportion of gas, in addition to a larger total quantity. This was where he thought Mr. Herring, in that valuable paper of his, given before the North British Association in July, was dealing with a point not touched on before—viz., that there was another factor besides the calorific value of the gas, and that was what he termed the flame volume. He should like to compare the tests. Those before them that day referred to Liverpool, and the others referred to Edinburgh. Each of these two sets of tests was taken as given by the two authorities under certain conditions which they had explained to them. Mr. Herring made this difference—he was not content simply to regulate the supply of air with the gas, but he also adjusted his supply of gas, so that the mantle was thoroughly enveloped. If they referred to the tables, it would be found that with gas of 15½-candle power up to about 20-candle power, they secured practically the same results per foot per hour by adjusting, not only the air supply, but the gas supply as well. He evolved from this his theory that flame volume had a great deal to do with it. The rates of consumption per hour over these tests were also very curious. They ranged from 2·89, the lowest, to 3·40 cubic feet per hour. These consumptions had little in common with the illuminating power as tested by the argand burner—that was to say, the 16-candle gas in one case might be very different from that in another, and the adjustment of the gas and air to obtain a given flame volume and to secure for the mantle its maximum, depended on the composition of the tested gas. The table was an interesting one, and threw a glaring side-light on the conclusion which Mr. Allen had put before them. Mr. Allen said that the conclusion was inevitable—namely, that 20-candle gas was the cheaper; but he did not think that was so. His tables showed that from July to November, 1905, practically the 17-candle gas as tested in the argand burner showed a loss of 13 per cent. The tables indicated a progressive deterioration as they came down in the scale of illuminating power. This was simply because the gas was not adjusted properly. It might have required a greater quantity of gas to have fully illuminated the mantle to obtain the best results; but there would have been a greater and still more powerful light. He had taken a No. 4 mantle, to see what light could be obtained from it under the most favourable conditions normally. Much more gas could be consumed if means were taken to introduce into the burner an increased proportion of air; and thereby an increased total lighting duty for the mantle would be secured. At the same time, the various means of concentration which were adopted brought about greatly increased illuminating power per cubic foot of gas. Mr. Herring's tests were taken with a different burner; but his results were all comparable, as also were Mr. Allen's. The phenomenon of the people of Liverpool preferring that "burnished gold" appearance given by the flame burner was a mark, he supposed, of the visionary age in which we lived; and it was possible that this figure of Mr. Allen's might be handed down to posterity as the last languishing glow of that sun which sets above the horizon. Did it not appear strange that, despite the pale moonbeams which were supposed to emanate in Liverpool from the incandescent burner, the people—even given the burnished gold appearance—should prefer 4 candles when by the tests shown in this paper they could obtain four times more light by using the incandescent burner? Surely, under these unfair conditions, the people of Liverpool were too much alive to their own interests to any longer prefer the ball of burnished gold to

those moonbeams which could be obtained at a much lower cost to them. His observations of the subject of gas in incandescent lighting led him to think that the richer the gas was as an illuminator *per se*, the more difficult it was to use it in an incandescent burner under normal conditions. They should bear in mind that these tests were all of them made in a laboratory, the mantles new, the burners clean, and so on. They might send out into every-day use new burners adjusted to suit the heavier gas, and they might give at the moment a better lighting duty per cubic foot than the burner using the poorer gas. But when they had been in use some little time, it would be discovered that at the outlet of the burner there were deposits which would retard the mixture of gas and air. With the lower-grade gas, this did not apply to the same extent. With the richer gas, though one had a better light when everything was clean and in order, with the lower-grade gas the light might be better with the life of the burner. He had noticed in towns in which they still had the higher standard, where incandescent mantles were used there was much more dirt thrown on the ceilings. He thought that these were great factors which affected the use of electric lighting in those places, and that customers still preferred in many instances to use the flat-flame burner. What was needed, he thought, was for them, as gas men, to study these questions with the view of discovering what the factors were which regulated the efficiency of these burners in every-day use, rather than in laboratory practice; and, having ascertained this, to teach their consumers, or, if they could not do that, to provide a staff sufficiently qualified to enable them to adjust the burners to meet the local requirements in the best possible way. If this were done, he thought it would be found that the lower-grade gas would compare much more favourably than was shown by the tables Mr. Allen had put before them, the results of which were much depreciated by the fact that the gas supply was not adjusted as well as the air supply.

Mr. Isaac Carr (Widnes) said, not only the Institution, but the gas profession generally were indebted to Mr. Allen for having brought this subject forward. It was one of the greatest possible importance, and yet was one that was least understood. He had listened with some little surprise to the remarks of Mr. Shadbolt, who had told them that, by adjustment, the results from incandescent burners could be changed or altered. Still, Mr. Shadbolt did not for a moment deny that the whole source of the light in the burner was a matter of heat, and that the poorer the gas the poorer the results. These conditions must apply in proportion. This brought him back to the question in the paper. The author stated that the question of high and low grade gas was one of general concern to those who were responsible for its manufacture and supply. Leaving incandescent burners out of the question for a little while, one might look for a moment at the pleas that were put forward on behalf of low-grade gas. Some of the pleas were that the consumer with the unmentionable flat-flame burner, which was supposed to have gone out of existence, would get as good results, or better, with a good burner, because he nearly always used a bad one. Then it was argued that low-grade gas would force the use of the incandescent burner; and it had been said that low-grade gas was as good as high-grade gas, and that having regard to its use for industrial purposes it was quite as good a servant. This was really the point. In his judgment, it was not so. The higher the quality of the gas, the greater the value to the consumer for whatever purpose it was used. Of course, in illuminating power the flat-flame burner was the greatest sufferer by a reduction in the quality; but for other purposes the calorific value of the gas was a gauge of its usefulness. It had often been said that calorific value bore no relation to illuminating power. This was quite true when comparing gas made from different coalfields and very different methods of production; but where the conditions were comparable, there was undoubtedly a relationship between the illuminating power and the calorific value of gas. He had found in his experience—and he had made hundreds of tests—that the calorific value rose with the light-giving quality of the gas. He had before him a diagram that was brought under the notice of the gas industry in a lecture delivered before the Gas Institute in June, 1900, and he saw that it had since been styled the Magna Charta of the "new" gas industry. In this diagram there was a fall in the illuminating power of the gas from 12·7 to 2 candles, and a fall in the calorific value from 600 to 553 B.Th.U., while the illuminating power in the incandescent mantle had increased by 15½ per cent. It was a pity the gentleman who had conducted the experiments (Herr Schäfer) had not continued them, because with one line going down and another going up, they would soon have got excellent results from nothing; and it seemed to him that it was unfortunate that they should stop where they did. His own observations in connection with the calorific value were not in accord with Mr. Allen's. He was very much surprised to see so small a range of difference in the calorific value as Mr. Allen had given. He had found the 20-candle gas made from coal and cannel grew to about 700 B.Th.U., whereas he (Mr. Carr) had never been able to get more than 560 B.Th.U. from the lower-grade gas which was given in the table as nearly 100 B.Th.U. more. This only showed the difference in the position of gas as affecting the calorific value. Then his own tests with incandescent burners had been very numerous. He had found a falling-off by making the best possible adjustment and varying the supply to the best conditions. He had never kept to a fixed consumption, but had always tried to get the best adjustment he could of the air and gas; and he had found a falling-off of about 2 per cent. in the light from an incandescent burner. The author had made reference to Widnes, and fell into the old fault of the "Gas World" of over-stating his prices; and, not content with this, he also under-stated his quality. He (Mr. Carr) wished to repudiate the suggestion that in Widnes they supplied a low-grade gas. They did not, as a fact, do so, and had never intended to. If the quality of the gas at Widnes was not to be compared with that of Liverpool, so much the worse for the consumer. Another point on which he was at issue with the author was this. He said in his paper: "There is no gas so closely tested by the public officials as that of Liverpool, and their evidence year after year is eminently satisfactory." On this he was at issue with the author, because he (Mr. Carr) said there was no gas so closely tested as that at Widnes; and he might go on to say that the evidence year after year was eminently unsatisfactory. With regard to testing gas, the author's own Company had secretly maintained a testing-station in his (Mr. Carr's) own town in the time of his predecessor; but whether or not this existed there now, he did not know. His gas at Widnes had for years and years been regularly and secretly tested by their friends. There the hosts of Sir George Livesey had gone away with the results which he supposed were eminently unsatisfactory to him (Mr. Carr), but most probably eminently satisfactory to themselves. Only last year had he survived the rearward attack from Bolton. He no sooner recovered from it than he found himself attacked from Southport. He believed these earlier tests had been carried out in the daytime; but the gentlemen from Southport sat 24 hours on end testing, while he (Mr. Carr) was in bed and sleeping. Those who talked about severe testing did not know what it was. This question of high *versus* low grade gas was a matter of importance to them at Widnes, because there they spent money on enrichment which might be given to the consumer in the form of a further reduction in the price of gas; but he believed if they did this the consumer would be worse off. In his opinion, the consumer was better off by having the money given to him in the form of enrichment than by a reduction in price; and for this reason they would continue to maintain, and not depreciate, the quality of their gas. He trusted that, from the unfortunate results which had arisen from a severe reduction in the quality elsewhere, it would be seen that it was a great mistake, and would in future be avoided by the gas maker, in the best interests of himself and the consumer.

Mr. J. G. Newbigging (Manchester) said the ground had been pretty well covered by the last two speakers; but he had prepared a few notes on the subject before them from his own point of view. He considered the question of high *versus* low grade gas was undoubtedly of the greatest importance to gas undertakings, and demanded their most serious consideration. Mr. Allen had rightly stated that no hard-and-fast rule could be laid down to apply to all gas undertakings as to the quality of the gas to be distributed, but that the matter must be decided on the conditions and circumstances existing in each locality. The *crux* of the whole question was that, if a reduction in the illuminating power was contemplated, the full difference in value to the consumer could be given in the shape of a reduced price. It was necessary that the question should be looked at solely from the point of view of the consumer, or they would be playing into the hands of their competitors, and would be losers by the change. If this reduction in price could not be made, then to take the step of reducing the quality was unwise. Mr. Allen had said that ½d. might be taken as the cost of each candle between 16 and 20 candles. This might apply to large undertakings where carburetted water gas was manufactured; but it did not apply to the average works where cannel or benzol was depended upon for enrichment, and therefore for the majority of gas-works the cost of 1d. per candle still applied. He knew it was stated that benzol enrichment was carried out for less than 1d. per candle per 1000 cubic feet; but he had not found it so in his experience, especially when the make of gas per ton was high, and a low initial quality was produced. The cost of enrichment with cannel was higher than this; but it was more efficient and more permanent. Therefore, he should reckon the difference in cost between the 20 and 16 candle gas at 4d., as against Mr. Allen's 2d. Then, referring to Mr. Allen's figures, he (Mr. Newbigging) found that the tests he carried out in comparing the 20-candle and 16-candle gas at the Linacre works between July 18 and Aug. 4 showed a falling off of the lower quality gas when tested with the batswing burner of 21·5 per cent., in the incandescent burner of 13·2 per cent., and the loss in calorific power 4·38 per cent. Taking the 20-candle gas on the basis of 2s. 6d. per 1000 cubic feet, the 16-candle gas should be sold at 1s. 11½d. per 1000 cubic feet for use in the flat-flame burner, 2s. 2d. in the incandescent burner, and for heating, cooking, and motive power at 2s. 4½d. This was shown in Diagram No. 2. So that if Mr. Allen supplied 16-candle gas at 2s. 2d. per 1000 cubic feet, or even at a higher price, as he would show, it would be obviously to the advantage of all his consumers, with the exception of those who used flat-flame burners; and in spite of Mr. Allen's advocacy of the "beautiful flat-flame burner," he hoped the number in use would grow beautifully less as the years went by. With regard to the tests made with the two gases in an incandescent burner, Mr. Allen had stated that they were carried out with a Welsbach "C" burner, rated to 3 cubic feet per hour—the air supply being regulated to give the best results in each case. He had carried out similar tests under similar conditions with pretty much the same results. It occurred


CANDLE - POWER OF GAS.
CALORIFIC VALUE IN B. T. U. PER CUBIC FOOT.
CANDLE-POWER OBTAINED WITH INCANDESCENT BURNER.
ALLEN
LIVESEY, May, 1900.

NOTES.

	Livesey. Per Cent.	Allen. Per Cent.
17-candle gas is taken as the starting-point in percentages.		
Difference in candle power of gas between 17 and 10 candles . =	41·2 reduction	41·2 reduction
,, calorific ,, (B.Th.U.) ,, ,, ,, . . =	13·3 reduction	6·6 reduction
,, illuminating power with incandescent burner . . =	14·7 increase	27·2 reduction

Note.—Livesey's rate for incandescent burner = 3·5 cubic feet per hour.
Allen's ,, ,, ,, ,, = 3·0 ,, ,, ,,

	B.Th.U.	B.Th.U.
Calorific power of 17-candle gas.	600	664
,, ,, 10 ,, ...	520	620
	Candles.	Candles.
Illuminating power with incandescent burner with 17-candle gas =	48	68·0
,, ,, ,, ,, ,, ,, 10 ,, =	55	49·5

to him, however, that perhaps this was not really giving the lower quality gas a fair chance; so he instituted recently some tests with a Bray incandescent gas-burner, adjustable both for gas and air supply, and had found that over a considerable range of gases of different candle powers—4 to 5 candles difference—the efficiency per cubic foot of gas consumed was the same when both the gas and air supplies were adjusted to suit the gas under test. These tests were still being continued, so he preferred not to give any definite figure for the moment. Calorific value was not the main factor; it was a question of flame temperature. Some of them would likely remember the paper read by Sir George Livesey before the Institution of Gas Engineers in May, 1900, in which he stated that a 10-candle gas was superior to a 17-candle gas when used in an incandescent burner. He had obtained, with a consumption of 3·5 cubic feet, 48 candles, or 13·71 candles per foot, with the 17-candle gas, and 55 candles, or 15·71 candles per foot, with the 10-candle gas. He was sorry to say he had not been successful in obtaining such figures, but had evidently struck a middle course between Sir George Livesey's and Mr. Allen's results. The figures were so interesting that he had had Sir George Livesey's and Mr. Allen's results placed together in a diagram. Mr. Allen's own tests showed that 16-candle gas at 2s. 4d. per 1000 cubic feet was cheaper to the consumer for cooking, heating, and motive power than 20-candle gas at 2s. 6d. per 1000 feet; and in view of the results he had obtained with the incandescent burner named, he had not proved to his (Mr. Newbigging's) satisfaction that this did not also apply to those who used incandescent burners. He had simply proved that the higher quality of gas was cheaper to those consumers who continued to use the flat-flame burner, which he thought no one would dispute. But were consumers of gas for lighting with the incandescent burner and for cooking, heating, and motive power to be penalized for the sake of the flat-flame consumers? As a matter of fact, the latter was penalizing himself by paying from four to five times as much as he need do per unit of light. It was, of course, in some cases difficult to use incandescent burners, owing to vibration, &c.; but these instances were becoming rarer every day, owing to the introduction of appliances to obviate the difficulty. Of course, if Mr. Allen could persuade his consumers to continue the use of the flat-flame burner, which gave a light "like a disc of burnished gold," instead of the incandescent burner with less consumption of gas and consequently less vitiation of the atmosphere of the room in which it was used, well and good; but knowing, as he did, the great saving which had been effected in many cases by substituting the incandescent burner for the flat flame, he thought some consumers would consider it all moonshine if attempts were made to persuade them to revert to the old order of things. There was no doubt that the inclination was to go too far with this reduction in illuminating power; but there was a middle course which was of advantage to both the manufacturer and the consumer. They were much obliged to Mr. Allen for his paper; but he had made out a poor case, even for his own district, in continuing to distribute such a high quality of gas as 20-candle power.

The HON. SECRETARY said it seemed to him that Mr. Allen's statement, that the point of view he enunciated only concerned Liverpool, was intended to disarm criticism. The paper bristled with controversial points; one of the first being that, with the flat-flame burner, 10 candles per 4 cubic feet was all they could get. With the adjustable burner, they could regularly obtain 12 candles per 4 cubic feet and 15 candles per 5 feet, using an 8 top on a 4 bottom. He also made a great error in history. The demand for low-grade gas followed the incandescent burner, not the incandescent the low-grade gas. What was low-grade gas? To Mr. Allen and the advocates of 20-candle gas, 16-candle gas was low grade; to others, who had supplied 16-candle gas for decades, it was 13 and 14 candle gas; to the Scotsman, 20-candle gas was low grade; and until they got a definition of low grade, the term was far too elastic for general use. Again, various methods of testing made a difference; and there could be no actual comparison between different towns. When a new Gas-Works Clauses Act made it compulsory for everyone to use the No. 2 "Metropolitan" burner, uniformity would be attained. The question was not between the relative cost of illumination by flat-flame and incandescents when using 20-candle gas, but between 20-candle gas in the flat-flame and 16 candles or lower in the incandescent burner. Comparing Mr. Allen's figures on this basis, they got: Flat-flame burner, 20·6 candles at 30d. = 1·456d. per candle; incandescent burner, 63·54 candles at 28d. = 0·440d. per candle. The incandescent burner was $3\frac{1}{2}$ times cheaper, light for light, than the flat-flame. There were other points about the tests which he could not understand. There was the loss of efficiency. Mr. Allen gave in his tests of gas made of different qualities the loss in actual B.Th.U. and the loss in efficiency for 16-candle gas. The loss of light in the incandescent burner compared with 20-candle gas was 13·2 per cent., and of calorific power only 4·38 per cent.; compared with 12-candle gas, 23·21 per cent. and 5·08 per cent.; with 10-candle gas, 30·80 per cent. and 8·95 per cent.; and with 8-candle gas, 39·86 per cent. and 12·18 per cent. There must be something wrong there. The incandescent burner depended entirely for its illuminating power on its flame temperature; and as this would practically correspond with the

calorific power of the gas employed, the loss in efficiency should not be very much more than the loss in heat units. But perhaps Mr. Allen would explain this difference. The author also said that the 20-candle gas required practically the same quantity of air as 16-candle gas; but as the former contained 35 per cent. of carburetted water gas, and the latter 50 per cent., he should not have expected it—in fact, the more there was in the mixture the less air was required for complete combustion. A few tests with the No. 2 "Metropolitan" burner would prove this over and over again. If they knew how the 12, 10, and 8 candle gases were produced, they might be able to follow the other tests better. Probably the mode of manufacture had some bad effect on the heating value; but as 10 and 8 candle gases were not within the range of practical politics, they need not trouble themselves much about these figures. The others, however, were so self-contradictory that they could not be accepted as absolutely reliable. He had made a number of tests with a Kern burner on gas of 17·55-candle power containing 35 per cent. of carburetted water gas; the calorific power being 562 to 572 B.Th.U. net, the indicated illuminating value for 4·07 cubic feet per hour being 75·68 candles at the higher, and 71·28 candles at the lower calorific power. The air supply was not altered; and the heat units per candle were 7·88 and 7·56 B.Th.U. respectively. When, however, the air supplies were varied, the results became regular, and they distinctly improved. Then by altering the air supply to less than 12 per cent. in one case and more than this in the other one, the illuminating power became 79·2 candles and 80·8 candles respectively, or 7·01 B.Th.U. per candle in each case. Reducing the air still further by 25 per cent., the illuminating power became 76 candles; and by 35 per cent., 68 candles. With another make of burner, by increasing the air supply to double its original quantity, the illuminating power of the mantles rose from 63 to 65 candles; while the consumption dropped from 4·4 to 3·6 cubic feet per hour. In this burner there were five air-holes; and the illuminating powers with one, two, three, and four closed were as follows: Full open, 65 candles; one closed, 62 candles; two closed, 58 candles; three closed, 56 candles; four closed, 47 candles—the consumption remaining constant throughout. Upon these results, it was evident that the air supply was increased too much; but as the burner was one of a type in general use, it afforded a good index of what could be done by generally increasing the air supply. These remarks did not, of course, apply to such a burner as Bray's, which had an air-regulator. He had gone into this question so much with the view of following up the trenchant criticism of the "Gas Journal" on Mr. Launcelot Wild's tests. He had been able to obtain in regular practice fully 7 candles per foot more than he showed with the Kern burner and 2 candles per foot with the "C" burner. It was unfortunate for the gas profession he had copyrighted the books, otherwise he was afraid there would be worse things in store for him than the very severe handling he had already received; but the fact that these figures would be used against them by their rivals, the electricians, must put them on the *qui vive* and scotch the wheels before they had got beyond their reach.

The President said all would be agreed that they had had a wonderful discussion that afternoon—proving what statisticians could do with statistics under certain conditions. The mere fact that there were these tests, made them wonder where a comparison was to be started and finished. He was very much struck with the fact that so prominent a man as Mr. Launcelot Wild had lent his name to such figures as has been stated by Mr. Kendrick, because they were perfectly alarming. There would really be no illuminating power in their gas if they were to take the figure he named in his authoritative tests, as he called them. He was personally very much obliged to the readers of the papers, which had been productive of good discussions; and he trusted that they would be favoured with many more of a like character.

Mr. Allen, in reply, thanked the various speakers for the way in which they had criticized his paper. Mr. Carr seemed to think that his remarks with regard to high-grade gas had simply reference to Widnes; but it was nothing of the sort, as would be seen on reference to his paper. When he said, "In that field high-grade gas is almost useless," he did not suggest for a moment—though such an inference was capable of being drawn—that there was not high-grade gas at Widnes. Mr. Carr said there was high-grade gas there; and he knew more about it than anyone else. He could assure Mr. Carr that he did not intentionally connect Widnes with low-grade gas. This had been the only bitter feeling introduced in the discussion; and he thought it represented rather more heat than illuminating power. He thanked Mr. Shadbolt for the able criticism of his tables. He was very glad that Table No. 2 and the experiments at Linacre had been referred to in the paper, otherwise he was afraid that there would have been nothing to criticize. He did not place any reliance on the figures resulting from the tests made at Linacre. His reference to the deduction drawn from the process followed was entirely taken from the experiments with the 16-candle flat-flame burner, for the reason that it was not possible to test with a lower quality than 16-candle gas in Liverpool. This was a very low-grade gas for Liverpool; and therefore it was that in his paper he had more than once asked them to consider that the question had reference to Liverpool, and not to Manchester. Liverpool was unique in that for many years 20-candle flat-flame gas had been supplied; and the Liverpool public, who had flat-flame burners to-day, would not part with them—they admired the golden light. The Engineer himself directly, and through his Assistant, endeavoured constantly to induce the consumers to use incandescent burners. His paper distinctly realized the greater efficiency obtained by any gas in an incandescent burner than in a flat-flame one. When he spoke of getting 10-candle light for 4 cubic feet from a flat-flame burner, this was with a common low-grade gas. In Liverpool, they gave a man 16 candles in a flat-flame burner; and that man loved it, and would not part with it. Anyone going to Liverpool would see public-house after public-house with flat-flame burners giving a glorious light. If the manager was asked, "Why do not you have incandescent burners?" he would say: "We will not have those wretched cold things. The parlour is cosy with a flat-flame burner, but it is not with an incandescent burner." If one went to a butcher and said, "Why have you got flat-flame burners? Why do not you have incandescent lights?" he would reply: "I could not sell my meat with them. A flat-flame gas-burner gives such a curious light that the meat is worth 1d. a pound more." It was not possible to coerce a customer. One might agitate; but one must not say, "I will not give you this beautiful golden flame." Some years ago, the experiment was made of giving a certain section of Liverpool over 20-candle carburetted water gas, the density of which they knew was very great. The result was that when a man was passing 4 cubic feet of gas through a flat-flame burner, he only got 3 feet through, with the consequence, of course, that the light became very much worse. They had shoals of letters asking for the old gas; and for eighteen months they were doing nothing else but going round the district sending men about to take off the small burners and put on the large ones to give the old light. They had some difficulty in explaining that they were not burning more gas with the large burner. This experience would show what would happen if they brought their quality down from 20 to 16 candles. He had not had a complaint about the quality of their gas for many months, and yet there were numbers of people using only flat-flame burners. He would repeat what he had said in his paper—they must endeavour to try and suit their customers. It was not an engineers' question entirely, it was a directors' question. He had no desire to criticize the policy of his Directors. The tests tabulated in Table II. were simply experiments made with various qualities of gas squeezed to get the uniform rate. With regard to the air required with 16-candle gas as compared with 20-candle, the latter had 50 per cent. of carburetted water gas, which required less air than the coal gas; and it appeared that the smaller percentage of hydrocarbons in the 16-candle gas called for less oxygen. As a matter of fact, when one endeavoured to alter the air supply in a burner after trying one gas and testing the other, it was found that it did no good whatever. They had attempted to get the best results with 16-candle gas and 20-candle gas. The second table was only useful in so far as they cared to make use of it. In reply to Mr. Shadbolt, he might say that his results were not obtained with new burners or new mantles; the tests were all under ordinary conditions. They had a new mantle to start with, but it was used again. They had got as high as 30 candles, and it went down as low as 25 or 26. It was only when the mantle showed deterioration that a new one was put on. The burners were not new; but, of course, they were cleaned and blown in the ordinary way when the mantle was changed.

Mr. Shadbolt asked whether the burners were burning the whole time, or only during the test.

Mr. Allen replied that the burners were in use during a large portion of the time when no tests were being made. No doubt, one might have a burner that was not suitable for rich gas; but there was not this trouble at Linacre. When a consumer complained about his burner being choked, he invited him to step outside and inspect the public lamps, which gave no trouble at all. People who used flat-flames had great confidence in them. One old lady, when recommended to make a change, said she had had her burner for thirty years, and did not intend to get rid of it. With regard to what Mr. Carr said about secret testing, it was possible that the Southport people had a good reason for testing for 24 hours; but, he must say, that whatever tests were made by Liverpool were made honestly, and extended throughout the hours of darkness only. The tests were quite satisfactory, and enabled them in Liverpool to realize why the Widnes gas was sold at a very low price. Mr. Newbigging put the case in a nutshell, when he said there was no hard-and-fast rule, and that every manager must be guided by local circumstances. Carburetted water gas could be made cheaper in Liverpool than coal gas; and but for this they would have to sell nearly 1500 tons of coke more per week than they were at present selling. With regard to the use of cannel and benzol, all those who were looking with dread to their purchases of coal next year would be much easier in their minds if they used a larger amount of cannel. The cannel market was not going up; and those who were using it were much obliged to those who were not. It was cheaper to make 1000 cubic feet of gas from cannel to-day than it was to make that amount from coal—taking both the quantity and the quality into consideration.

Vote of Thanks.

Mr. J. H. Brearley then proposed a hearty vote of thanks to Mr. Stevenson and Mr. Allen for the papers which they had read.

Mr. Duxbury seconded the proposition, which was carried unanimously.

INDIA-RUBBER JOINTS FOR MAINS.

In the last number of the "JOURNAL," we gave (p. 465) an abstract of a paper on the above subject read by Herr Burgemeister, of Celle, before the Association of Gas and Water Engineers of Lower Saxony. In view of the change in the character and the increase in the quantity of traffic now passing along the main thoroughfares of towns, the effectual junction of mains becomes of greater importance than hitherto; and consequently any material that helps to ensure soundness deserves attention. We therefore supplement the particulars given last week by some received a few months ago from a correspondent in South America, who has had opportunities of testing the value of india-rubber joints for gas-mains.

A question arose as to the renewal of a 2-inch main on the higher portion of a town on the Pacific coast; and in the report on the matter presented by the Manager of the Gas Company to his Directors he stated that about fifty mains, which were india-rubber jointed, had been tested under a pressure of 15-10ths, and that, though they were in a very rusty condition, and broken in several places, all the joints were sound, there being not the slightest sign of a leak in one of them. This report was regarded as highly satisfactory, inasmuch as the 2-inch main referred to must have been one of the first put down when the gas-works were started, and had been laid in a very light, dry soil at an average depth of 2 feet. Most of the pipes were rusted through to quite ¼ inch; but the rubber in the joints was as soft and elastic as when it was new.

Our correspondent was able to procure some information on the subject in regard to a neighbouring town, where at least from 70 to 80 per cent. of the mains are jointed with india-rubber rings. After an experience extending over nearly twenty years, they had been found to be far preferable to, and much cheaper than, lead joints, and lasted practically as long as the mains themselves, especially when these were laid in damp or wet ground. Mains which had been in use for more than thirty years had been taken up, and the rings found in perfect preservation. On drawing the joints apart, one half of the ring would usually adhere to the spigot end, while the other half remained in the socket; the body being as fresh and elastic as when it was first fixed. When leaks were discovered in the joints, they generally occurred when the mains had been laid in dry ground and near the surface; thus allowing the air to get at the ring and dry it up, as well as rust the main—the rust gradually forming inside the faucet, and working its way in between the iron and the rubber and in this way causing a leak.

One case occurred where it was necessary to replace a 2-inch main by a larger one, for a distance of about 720 yards; the average depth being about 20 inches, and the ground light and dry. On stripping the mains, an escape was discovered at nearly every joint; and these, on being taken apart, were found to have a coating of rust on the outside and inside of the ring. But whether this was due to the rusty condition of the mains when originally laid or to air getting at the joints, it was impossible to say. This experience, however, was sufficient to deter the Engineer from laying mains with india-rubber joints in ground where there was no moisture. In another place, where a considerable portion of the smaller pipes have been jointed with india-rubber rings, a favourable opportunity occurred recently for overhauling the mains, and there was rarely found a faulty joint when made with a ring, whereas a considerable number of leaks were discovered in the lead joints.

Our correspondent remarked that the experience above recorded entirely corroborated his own. In his case the rings lasted longer than the mains; and there was no perceptible increase in the leakage—from 8 to 9 per cent. being the average. In no instance, so far as his recollection serves, has it been necessary to renew an india-rubber joint.

In connection with the foregoing particulars, it may be mentioned that the mains which supply the suburbs of Paris with gas from the new works at Gennevilliers were laid with india-rubber joints, an illustrated description of which was given in the 'JOURNAL" for the 8th ult. (p. 87).

Scottish Junior Gas Association.—The members of the Western District Section of the Scottish Junior Gas Association visited the Phœnix Tube-Works, Glasgow, belonging to Messrs. Stewarts and Lloyds, Limited, last Saturday afternoon. The works are quite near to Dalmarnock Bridge, at which point the members assembled. They were received at the works by Mr. Marshall, the Manager, and by Messrs. Cross, Dixon, and Gourlay, who became the leaders of four parties which were made up. The machines used in the various processes of making tubes were carefully explained. One of the most interesting portions of the works visited was the small fittings department. The beautiful finish of the solid-drawn tubes was greatly admired. The new producer-gas plant erected by the firm, from the working of which the management anticipate very successful results, came in for much attention on the part of the visitors. Over two hours were profitably spent in the works. The proceedings terminated with a hearty vote of thanks to the management, proposed by Mr. J. M'Leod, the President, and suitably acknowledged by Mr. Marshall, on behalf of the firm.

TESTING FUEL-GAS APPLIANCES.

In the notice of the first annual meeting of the American Gas Institute which appeared in the "JOURNAL" for the 6th of November last, it was mentioned that Mr. Henry L. Doherty presented, on behalf of the Ohio Association (one of the affiliated Associations), an interesting report by a Committee, of which he was the Chairman, on a Standard Method of Testing Fuel-Gas Appliances. The subject was originally brought forward in 1903, when a report was made by the Committee; but they thought it should be amended and replaced by a revised one, which should take the form of a detailed explanation, should be issued as a pamphlet, and be supplied to all gas companies and manufacturers of appliances. The report has been published, and its scope will be gathered from the following extracts from it.

In their preliminary remarks, the Committee point out that until the meeting held in 1903 no attempt had been made to establish standard methods for testing fuel-gas appliances; and they explain that the object of their investigations is to reduce this work to such a condition that the same conclusions will be arrived at irrespective of the circumstances in which it is carried on. They say the field for gaseous fuel is practically unlimited, and the extent to which it is employed depends upon the energy displayed by the managers of gas companies, the price of their commodity, and the efficiency of the appliances available for its utilization. They think it is possible to materially increase this efficiency, and thereby open up more extensive fields for the use of gas than could be done by making a reduction of 25 per cent. in the average selling price. With this explanation, they proceed to give details of the testing methods they recommend—doing so in such a way as to allow of the work being taken up by any ordinary workman, without demanding more than a minimum amount of attention from the engineer or manager.

The first essential in the testing of gas appliances is to have gas of constant calorific value, or a serious error will be introduced at the very outset. The second is that the supply should be at constant pressure; and as 20-10ths is general, the Committee recommend it. They point out, however, that, whatever the pressure employed may be, it should not be variable. As it is seldom possible to get constant pressure unless tests are conducted at the works, it is absolutely essential that a reliable regulator should be used, which should be adjusted to deliver gas at a pressure of 20-10ths. It is equally important that the supply of water, which is used for absorbing the heat of the gas, should be continuous. If the pressure is not constant, the requisite temperature conditions cannot be obtained. A simple and effective method of maintaining a constant head is by means of a flushing-tank furnished with a float-valve, but with the syphon removed. The tank should be placed high up in the testing-room, and a connection made with the service-pipe or other available source, the head of which will always be sufficient to supply the tank at the height at which it is placed. The water for testing is drawn from the bottom of the tank, and the float-valve admits as much water as is taken away, and maintains the head at practically a uniform level.

Passing on to indicate the appliances they purpose dealing with, the Committee state that their report will cover only water-heaters and gas-ranges; and that they will specify methods for determining the extent and division of the losses, and furnish, in regard to some of them, explanations which they think will be calculated to assist experimenters and possibly designers. For the sake of convenience, the following classification is made:—

Water-Heaters.	*Gas-Ranges.*
Circulating	Top burner—
Instantaneous—	(*a*) Regular.
(*a*) Direct.	(*b*) Simmering.
(*b*) Indirect.	(*c*) Giant.
	Oven and boiler.

They explain that circulating water-heaters are of the class ordinarily termed independent heaters, and by preference designated "circulating" heaters by the nature of their operation, which is due to circulation produced by the action of the heater regardless of conditions of pressure. Direct instantaneous water-heaters are those in which the products of combustion come in direct contact with the water; and indirect instantaneous heaters are those in which the heat is transmitted through a metal wall, generally a tube, through which the water flows, and are operated under service pressure conditions. Range-top burners are generally of three sizes—(*a*) the regular, of medium size, of which there are usually three on a range; (*b*) simmering, which is the very small burner, sometimes placed in conjunction with one of larger size, and intended to keep hot a vessel which has been brought to the desired temperature over a larger burner; and (*c*) the giant, which is a burner of larger capacity than the ordinary one, and is intended for heavy or fast work. The range oven is essentially an enclosed chamber, which may be evenly heated to any temperature required for domestic baking. The range boiler, as usually constructed, is also an enclosed chamber, placed either below the oven or elsewhere; and a very high temperature is required for the work it has to do.

CIRCULATING WATER-HEATERS.

With the exception of the direct instantaneous water-heater, the circulating heater, in the opinion of the Committee, is the

most efficient gas appliance now available; but they think it can be materially improved. The efficiency of a heater varies with the rate of circulation through it; and therefore it is important that freedom of circulation should be considered. The Committee set forth the reasons for this, and urge manufacturers to design their heaters so as to ensure free circulation. The losses prevalent in existing water-heaters are attributed to over-ventilation and excessive flue temperature; and it is acknowledged that it is in these two respects that the manufacturers of the best appliances have made the greatest improvements. The Committee do not approve of connecting a water-heater to a flue, unless a broken flue-pipe, similar to that shown in the accompanying diagram (fig. 1), is used; and they recommend that the canopy shown should be placed about 6 feet above the burner, regardless of the length of the heater. Lack of draught in the chimney, without the use of the canopy, may cause the heater to "smother;" while excessive draught will draw in a quantity of air far beyond that which is needed for proper combustion. The excess of air will rob the water of a considerable amount of heat which it would otherwise secure.

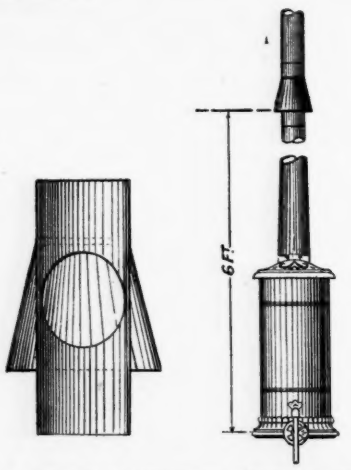


Fig. 1.—Method of Connecting Canopy to Heater.

The Committee direct attention to a point which they consider manufacturers of water-heaters have avoided; or, if they have not done so, they do not appear to have secured the best possible results. Gas as sent out for consumption contains a considerable quantity of hydrogen, which, during combustion, combines with oxygen to form aqueous vapour (H_2O). The heat of combustion of hydrogen is greater than that of any other gas; but unless each pound of aqueous vapour which is formed is condensed before leaving the apparatus, it will carry with it at least 965 B.Th.U. If this moisture or steam were condensed within the apparatus, and the water of condensation removed without its being allowed to fall back upon the heated metal of the interior (in which case it would be re-evaporated), this latent heat might be saved. The flue gases will, of course, pass off saturated; but at a temperature of (say) 180° Fahr. they would contain about 2 per cent. of moisture by weight, while at 212° the amount of vapour carried off might be infinite. Usually, 1 lb. of water would be formed by each 15 to 20 cubic feet of gas consumed, or approximately 1 oz. of water to a cubic foot of gas; while with no over-ventilation and a flue temperature of 180° Fahr., only about 0·0003 lb. of aqueous vapour would be carried off for each cubic foot of gas burnt. It is therefore evident that practically the total latent heat of the aqueous vapour might be saved. Besides the economy, which would be about 60 B.Th.U. saved for each cubic foot of gas consumed, all objectionable moisture would be removed from the room and flue. As the formation of moisture is one of the most objectionable features of water-heaters, this would be a very desirable improvement. Summing up their observations on this matter, the Committee say that the ideal water-heater, in which perfect combustion takes place with little over-ventilation, and from which the products of combustion are expelled at a temperature somewhat below the boiling-point of water, would require no flue, for these appliances are usually placed in large and well-ventilated rooms; and as there would be, in this case, neither moisture nor odour, a small amount of carbonic acid gas would not be a serious objection.

Coming to the testing of circulating water-heaters, the Committee explain that the heater to be tested is connected with a 30-gallon boiler, as shown in fig. 2, by a 1-inch pipe; a thermometer being placed in the horizontal pipes at the top and bottom and valves A and B in each of the vertical sections close to the boiler, and another C in the lower horizontal pipe. The heater is set so that the burner is 4 feet below the top of the boiler, and a flue used extending 6 feet above the burner. The water supply is connected in line with the lower horizontal pipe to the heater, as shown; and it should have a cock F in it, by which the whole system may be shut off. A large cock E is placed on a T-piece at the junction of the lower horizontal pipe and the riser to the heater, by which the whole system may be drained; or by closing the cock C the heater may be drained when a change is made.

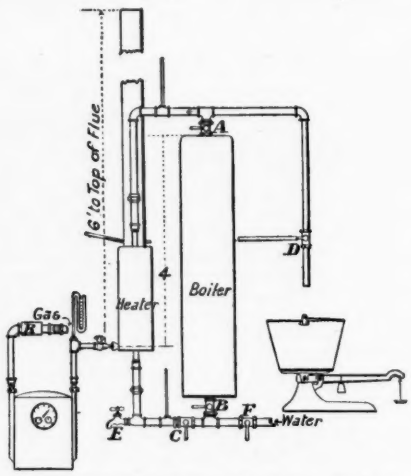


Fig. 2.—Method of Testing Circulating Heaters.

The outlet-pipe is connected in line with the upper horizontal pipe, and then brought down to such a height that the overflow may be conveniently caught in a bucket placed upon scales. At the lower end of the overflow-pipe is a special cock D, capable of accurate adjustment, by which the flow of water may be regulated. This cock is an ordinary lever cock with the slots filed diagonally, so that a very gradual closing or opening may be obtained with the assistance of 18 inches of gas-pipe, which is driven on to the lever after it has been filed to an approximate fit. The gas is measured by a test-meter; and a good regulator R is placed at the back of it to ensure constant pressure.

The first test of a water-heater is to determine its efficiency by natural circulation. This is done by lighting the heater, using the maximum flow of gas, and noting the differential temperature of the thermometers at the end of 10 minutes. The overflow-valve D, only being closed during the test, the valve F must be open. Then open the valve D, and cut the boiler out by closing the valves A and B. Adjust the flow of water by D to such a rate that the same difference of temperature is obtained that was observed at the end of 10 minutes' run. When this is obtained, and has been maintained long enough to show that stationary conditions have been established, weigh off a quantity—say, 20 lbs.—of water; observing the amount of gas used during this time. The weight of this water multiplied by its rise in temperature will give the heat units collected; and the product divided by the total number of units in the gas measured will give the percentage efficiency of the heater under usual working conditions.

As no two kinds of heaters are constructed to use exactly the same quantity of gas, it is desirable to have a test by which they may be compared. This is obtained as follows: The heater is allowed the maximum supply of gas; but the differential temperature is adjusted to 50° Fahr. by the rate of flow of the water, and the efficiency determined as before. Tests are made for each multiple of 5 cubic feet of gas per hour, from the maximum down to 10 feet. By plotting curves of the results as found, an accurate comparison of efficiency and capacity may be obtained. If the actual calorific value of the gas is not known, and cannot readily be determined, an arbitrary value may be assumed, and the results will then be comparative only; but a comparison is all that is necessary for the buyer. Manufactured gas will usually give about 650 B.Th.U. per cubic foot; and this figure may be generally used where the exact calorific value is not known, and great accuracy is not required. Another valuable test to make on circulating water-heaters is to connect them to a tank or tanks from which the water is withdrawn with sufficient rapidity to prevent overheating, in the same manner as in domestic use. Then they should be run for several hours each day—all alike—and monthly determinations made of their efficiency. It will be found that some heaters stop up much sooner than others; and in localities where considerable precipitate is formed, it may be impossible to use certain heaters, even though their efficiency is very high when new.

Instantaneous Water-Heaters.

Direct instantaneous water-heaters, or those in which the products of combustion come in direct contact with the water, must necessarily be operated without back-pressure. This class of heater has the great advantage of a very low thermal capacity, and condensing much of the water vapour formed by combustion, where water somewhat below the boiling-point is being withdrawn; making it possible to obtain much higher efficiency than by the indirect method, and, for the same capacity, with less size and cost than for the indirect heaters. But, on the other hand, there are several disadvantages. The heater must be placed near the point where the water is to be used; it being necessary to regulate the supply at the heater. This is sometimes prohibitive, and if water near the boiling-point is required, there is an excessive loss in the flue; for, as it is impossible for all the water to reach exactly the same temperature when passing through the heater, the temperature of some will exceed the boiling-point, and as it is not confined, will be lost up the flue as steam.

The indirect instantaneous water-heater may have the advantage of being automatic, and of being placed in any convenient location, regardless of where the water is to be used; and it may be adjusted so that water which is almost boiling, and, in fact, even steam, may be obtained. Being under higher pressure, a high temperature can be maintained without formation of steam. Under an absolute pressure of 14·7 lbs., this takes place at a temperature of 212° Fahr. If the pressure named is increased, the boiling-point is raised. This makes it evident that where an indirect heater is used under (say) 60 lbs. gauge pressure, or 74·7 lbs. absolute pressure, the boiling-point is 370° Fahr.; so that the temperature of the water in the heater may be raised above the atmospheric boiling-point without the formation of steam on the interior of the heater. It is apparent that each heater has its advantages, and both classes give excellent results where they are properly applied. Where very hot water is required, or where it is inconvenient to have the heater at the place where the hot water is used, or where hot water is wanted at several places, the indirect heater is superior. But if water somewhat below the boiling-point is to be used, such as for the bath, or washing, &c., much higher efficiency may be expected from the direct heater, with less space occupied and less cost of installation. Both have the very serious disadvantage of an excessive gas demand, and necessitate the installation of an abnormally large service and meter for a consumer whose monthly bills are below the normal.

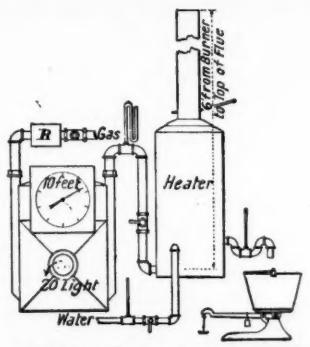


Fig. 3.—Method of Testing Instantaneous Heaters.

The method of testing the water-heaters under consideration is similar in principle to that of testing circulating heaters; the connections being made as shown in fig. 3. As some of these heaters are designed for large gas consumption, a service, meter, and regulator of ample capacity must be used. A 20-light meter, tested for accuracy, may be arranged as shown in the figure, with a large dial calibrated to tenths of a foot, and with the hand attached to the spindle of the 10-feet hand on the original meter dial. A rubber band placed loosely over the spindle and one corner of the large dial, as shown, will take up the back-lash of the train of gears in the meter—making it possible to estimate readings to hundredths of a foot. The water supply is the same as for the circulating heaters. A thermometer is placed in the water supply-pipe near the heater, and a special cock, such as the one used for circulating water-heaters, is employed to control the rate of flow, unless a good valve is supplied by the maker, and attached to the heater. Another thermometer is placed in the outlet-pipe, trapped as shown in the diagram, and the water caught as before and weighed. Heaters having automatic controlling devices should have them cut out or removed during the test. A flue is supplied, the top of which is 6 feet above the burner.

The first test is to determine the efficiency of the heater at the maximum gas consumption, and with the flow of water adjusted so that a 50° rise in temperature is obtained. A similar test is then made for each multiple of 5 cubic feet of gas consumption down to 20 cubic feet, with a 50° rise in the temperature of the water in each case. Then, with the same rates of gas consumption as before, a similar set of tests is made, except that the water is drawn off at a temperature of 120° in each case. By plotting curves of the results obtained from each test, it will be readily apparent, when the requirements of a particular case are known, which heater should be supplied.

Gas-Ranges.

The Committee now take up the second division of their subject; their opening observations being in the nature of a discussion on gas-ranges. They remark that the very large number of these appliances at present in use is sufficient indication that they have generally met with public approval; and there is no doubt that, compared with other methods of cooking, the gas-range has no rival. At the same time, they think that every gas manager will acknowledge that gas is not the most economical fuel. This is the only reason for the gas-range not being adopted by every individual situated where gas can be obtained. It would therefore seem entirely to the interest of gas companies to make the range as economical as possible. There is no doubt that where any gas appliance is used for a variety of purposes, it is difficult to obtain high efficiency for each; and this, the Committee think, is probably the reason for the low efficiency of a gas-range. For instance, though there are three different sizes of burners on the top of a range, under no condition does their efficiency rise much above 50 per cent. The oven is used for numerous purposes, such as the baking of a light cake, requiring a temperature of less than 300°, or a batch of biscuit, requiring 100° more. Then also many people use their ovens for roasting; and where they are employed for this purpose, a still higher temperature is at times desirable. Owing to these various requirements, it would be difficult to make a standard apparatus for determining the actual efficiency of a gas-oven. Consequently, in this case comparative tests which are very simple will be used, and, as far as gas companies are concerned, are quite sufficient. All the heat of the gas, when nothing is removed from the oven, must eventually pass out by the flue or by radiation. If each of these losses is determined, the manufacturer may readily find where an improvement is possible. To determine the relative value of insulating material used to prevent radiation, a very simple and effective method is to place (say) 25 lbs. of loosely coiled copper wire on the lower rack in the oven; then, by lighting the burner, bring the temperature somewhat above 600°. Turn out the fire, close the flue, and take successive readings of the temperature of the oven by a thermometer, the bulb of which is in the interior, and the graduations or stem outside, of the oven, where it may be read. The curve of this fall in temperature, when compared with curves made under similar conditions, but in other ovens or with other insulating material, will readily show which is superior.

In making an oven, the object sought is an enclosed air-space highly and evenly heated. It is apparent that a very thin wall of iron would not keep the temperature of the enclosure as high as a heavy wall of non-conducting material with the same supply of heat; and if an excessively large flue with heavy draught were used, a lower temperature would be obtained than with a flue of just sufficient size and with just the draught necessary to carry off the products of combustion. The Committee ask if there is not room for improvement here.

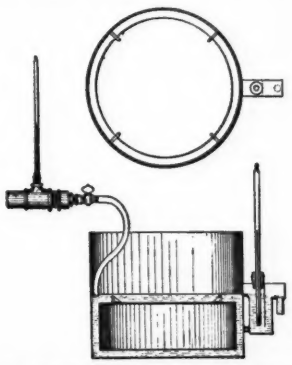


Fig. 4.—Appliance for Testing Top Burners.

The top burners of a gas-range may be tested in two ways. The simpler and less accurate is to evaporate water over the burners. On account of the variation of the boiling-point, due to changes of atmospheric pressure, the impurities in the water, and the fact that much of the work of the top burners is bringing water to the boil, makes it a rather doubtful test of actual efficiency; and tests by this method are usually somewhat below the results obtained in the following manner, which the Committee recommend. The diagram fig. 4 shows a copper pan, 10 inches diameter and 8 inches high, containing a concentric pan which is 3 inches high and 9 inches diameter, hermetically closed top and bottom, and supported from the bottom and sides of the larger pan by slender supports. The purpose of the inner pan is to displace a quantity of water, and thus cut down the thermal capacity of the apparatus. At a point 4 inches from the bottom of the outer pan is an overflow, arranged as shown, in such manner that the water will have to pass through a U-trap containing a thermometer before exit. The overflow opening should be rectangular and 1 inch wide, and the opening for the hose connection should be about $\frac{1}{8}$ inch lower, so that the level of the water in the pan will remain at practically 4 inches. The water is supplied from a constant head of known temperature, and the overflow is caught and weighed. The test is made by allowing a small quantity of water to flow through the pan, and by lighting the burner to the full consumption of gas under a pressure of 20-10ths. Then the flow of water is adjusted so that a rise of 50° in temperature is obtained. When the conditions have become constant, a convenient quantity of water is weighed off, and the amount of gas used while the water is being collected is noted. The heat units collected by the water, divided by the total number in the gas measured, will give the efficiency of the burner under good working conditions.

In testing ovens, to avoid complicated or troublesome methods necessary to determine actual efficiency, a deviation is permitted, and a comparison of the ovens only is made. A stem thermometer, registering to 600° Fahr., is inserted through a hole in the top of the oven to as near the centre as possible. Tests are made, starting with 10 for every multiple of 5 cubic feet, to the maximum flow as follows: The gas is adjusted to the desired rate of flow without being lighted; then shut off by another cock (there is always one at the back of the meter), so that the adjustment

will not be changed, and given time to clear from the appliance. It is then lighted, and readings of temperature are taken each minute, to get the curve of rise until the maximum temperature is reached. A comparison of the results obtained from each oven will readily show which is superior.

The efficiency of a range broiler is determined by the apparatus shown in fig. 5. It consists of a flat closed copper pan, 10 inches

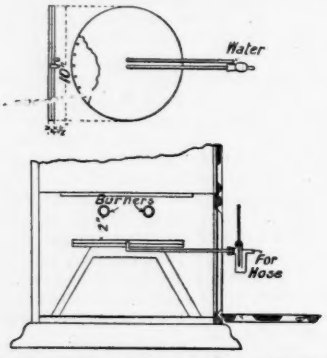


Fig. 5.—Method of Testing Range Broilers.

in diameter and 1 inch thick, closed tightly top and bottom, and with a parting diaphragm of copper half way between the heads, with small perforations near its periphery. The water is supplied from a constant head of known temperature through a ¼-inch brass tube to near the centre of the lower chamber. It will spread, passing to the upper chamber through the holes near the circumference of the parting diaphragm and then to the centre of the upper chamber, from which it is drawn down and out by another ¼-inch tube extending up from below through the lower chamber, and almost touching the upper cover. A slight pressure of water on the inside of the pan will raise the upper cover in the centre sufficiently to allow the necessary amount of water to pass out; and the slight rise in the centre will cause the water from all sides to flow into the centre, provided it is placed perfectly level. The top of the pan should be just 2 inches below the bottom of the flame, and must be central in the broiler. The upper side of the pan must be a dead-black, readily obtained with a coat of lamp-black mixed with spirits of turpentine and laid on evenly. The door of the broiler is left open, and a door of sheet iron made to fit in its place. The door must give the same insulation and ventilation as the original door had. The water supply and return are brought through this door, and the temperature determined at both of these places.

Loss of Heat in Flues.

There is a great difference in the amount of heat lost in the flues of different appliances—the loss in water-heaters being very much less than that of a range; but there is great over-ventilation in all. The method of determining the total loss in the flue and the loss due to over-ventilation are each given in the report; and the Committee think it will be found worth the while of any manufacturer to become familiar with them. Gas companies are not particularly interested in knowing where the losses occur in an appliance; they only wish to know which one gives the highest efficiency. The total loss in the flue consists of the heat carried off by the flue gases due to their increased temperature over that of the room and the service gas, and by the latent heat of the aqueous vapour formed by the combustion of the hydrogen in the gas and its rise in temperature.

In every gas appliance, a certain quantity of air must be admitted to support combustion; and, further, in every case more air is admitted than is theoretically necessary for the purpose. This air enters at the temperature of the room, and leaves at the much higher temperature of the flue. Supposing a case of a rise of 200° Fahr., which is common, every pound of air will carry off about 47·5 B.Th.U. This is the loss due to over-ventilation; and the object is to determine what proportion it is of the total heat which the gas was capable of developing. To make this determination, it is necessary to know what proportion the service gas bore to the sample of flue gas; in other words, how much service gas was burnt during the passage of a given sample of flue gas. Analysis will not show this; but the Committee describe a simple apparatus for making the determination. It consists of a test-meter, a Welsbach burner without a mantle, and a gasholder of several cubic feet capacity. The gas is measured by the meter and burnt in the lamp; the products of combustion being conveyed into the gasholder by suction through a pipe making close connection by a tin cone or funnel with the chimney of the lamp. A suction of about 3 inches is produced in the holder by balance-weights, and is then controlled by a cock in the flue-pipe, so that a natural flame is produced. The exact capacity of the gasholder should be determined by filling it with air drawn through the meter in the same way that the flue gas is taken in, and with the same suction to start with and stop as that used in the experiment—1·5 or 2 inches will be found convenient. The gasholder being filled with flue gas or products of combustion, and its total capacity known, an analysis by an Orsat apparatus is made of a sample of the contents, and the percentage of carbon dioxide determined; and from this is computed the total volume in the holder. The meter will show the quantity of gas used to make this quantity of carbon dioxide, from which the amount formed by the combustion of 1 cubic foot of service gas may be determined. This will not usually vary materially from day to day; so that if accurate results are at once obtained, they may be used till some change occurs in the service gas.

The over-ventilation loss may be found as follows: With an Orsat apparatus the percentages of carbon dioxide and oxygen in the flue gases are determined; and then, for convenience, these figures are assumed to be cubic feet. The carbon dioxide is then divided by the amount found by the experiment to be formed by the combustion of 1 cubic foot of service gas, which will give the number of cubic feet of this gas proportional to a sample of 100 cubic feet of the flue gas; and this quantity multiplied by the calorific value of the service gas will give the total heat supplied during the passage of such a sample. The oxygen found by the analysis is then multiplied by 0·0926 (a constant) and by the difference in temperature between the room and the flue, which will give the total heat carried off by the excess air. The heat lost divided by the total heat supplied will give the percentage of loss due to over-ventilation.

Loss not being considered, the percentage of over-ventilation may be determined as follows: Make an analysis of the flue gas by volume with an Orsat apparatus for CO_2, O, and (by deduction) N. In the proportion N : O :: 79·3 : 20·7, substitute the percentage of N found by the analysis, and solve for O. From this value for oxygen deduct that found by the analysis, which was the free or excess oxygen, and the result will be the oxygen used for combustion. The free oxygen divided by the oxygen used will give the percentage of over-ventilation.

The report concludes with a description of the method of analyzing flue-gases by means of the Orsat apparatus.

The Meaning of the Word "Artesian."

In the course of a paper on the subject of water supply and irrigation recently issued by the United States Geological Survey, Mr. Myron L. Fuller has discussed the significance of the term "artesian." He recalls the fact that it was first applied to flowing wells in the town of Artois, in France; but he points out that no definite meaning can be assigned to it in a scientific publication unless this is specially indicated by the user. Indeed, it is found that the same writer employs it differently in different publications. The predominant scientific usage of the term is for all wells in which the water rises—in other words, for those that exhibit the hydrostatic or artesian principle. In popular practice it is applied, in addition to the uses previously mentioned, to deep wells in general, especially those in rock, and to a certain extent to any drilled wells yielding water of good sanitary quality. After discussing the arguments for these various uses, Mr. Fuller gives the following definitions which were agreed upon by the members of the Division of Hydrology of the Survey as the most expedient at the present time: The "artesian principle" is defined as that in virtue of which water confined in the earth's crust tends to rise to the level of the water surface at the highest point from which pressure is transmitted. "Artesian pressure" is that exhibited by water confined in the earth's crust at a level lower than its static head. "Artesian water" is that portion of the underground water which is under artesian pressure, and will rise if encountered by the well or any other passage affording an outlet. An "artesian system" is a combination of geologic structures—such as basins, planes, joints, faults, &c.—in which waters are confined under artesian pressure. An "artesian basin" is one of porous bedded rock in which, as a result of the synclinal structure, the water is confined under artesian pressure. An "artesian slope" is defined as a monoclinal slope of bedded rocks in which water is confined beneath relatively impervious covers owing to the obstruction of its downward passage by the pinching out of the porous beds, by their change from a pervious to an impervious character, by internal friction, or by dikes or other obstructions. An "artesian area" is an area underlain by water under artesian pressure. An "artesian well" is any well in which water rises under artesian pressure when encountered.

The Council of the Institution of Mechanical Engineers have awarded the Willans Premium to Mr. H. A. Humphrey, for his paper on gas-engines; the selection having been made from among papers read during the last six years. The paper was noticed in the "Journal" for Dec. 18, 1900.

Lecturing to the Scottish Optical Association in Glasgow, on Monday evening last week, Professor Drysdale said he thought there was a great necessity for an unbiassed authority to whom the public might go for information regarding the respective merits of lighting apparatus, and also the measurement of the illumination of streets and halls. Lamps, and especially electric lamps, were not, as a rule, capable of yielding the power they were supposed to give, and generally consumed more energy than they ought to do. To his knowledge, there were at present no authoritative figures by unbiassed persons comparing the respective merits of gas and electric light. This was a field which they, as opticians, might take up.

EXTENSIONS AT THE CHICHESTER GAS-WORKS.

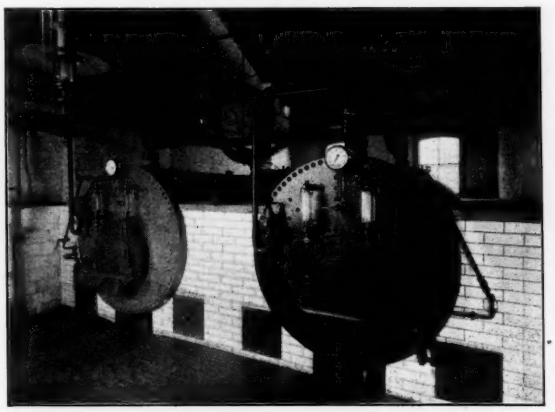
Inspection by the Corporation.

The scheme for the reconstruction of the works of the Chichester Gas Company, to which reference has already been made in the "JOURNAL" (see Jan. 9, 1906, p. 92) as being in progress to the designs and under the direction of the Company's Engineer, Mr. T. Ebenezer Pye, F.C.S., having now practically approached completion, the Directors of the Company invited the Mayor and Corporation to inspect to-day the new works and plant which have been erected and installed, and of some portions of which we give illustration.

The retort-house has only been partially reconstructed; the extension and enlargement proceeding gradually as the increasing consumption of gas may require. In the western section of the house, 10 beds of sixes have been put in. With the exception of those in the two end beds, the retorts are 22 in. by 15 in. D section. The furnaces most recently put in are of the shallow generator type. The retorts are charged by hand; but it is intended later on to introduce some form of suspended scoop.

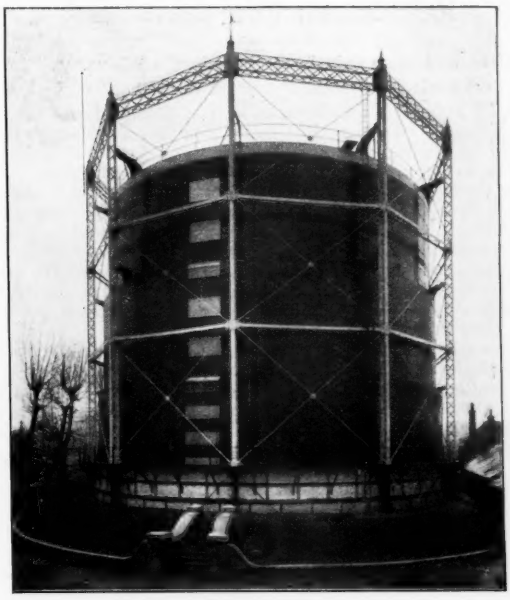
In the exhauster and pump room there is a 25,000 cubic feet per hour combined exhauster and engine by Messrs. G. Waller and Son, one of 15,000 cubic feet per hour by the Bryan Donkin Company, Limited, and a series of pumps for drawing water from a well situate on the Company's property, and for dealing with the liquor in the washer, scrubbers, boiler feed, &c. The boiler-house contains two Cornish boilers, 18 feet long, with Galloway tubes, and working with forced draught (Meldrum furnaces).

The condensing plant consists of a battery of Messrs. Morris and Cutler's well-known water-tube condensers, arranged for duplicating when required. The washer is one of Hunt's, in three tiers, arranged for additional tiers to meet an increased output of gas. The scrubbers are of the ordinary tower type, filled with rough sawn boards on edge. There are three new purifiers, 16 feet by 14 feet, and 5 feet deep, luteless, and fitted with Jäger grids. These purifiers are at present supplemented by those formerly in use as catch-boxes, which it is intended in course of time to replace by two or more luteless purifiers.



The Boiler House.

A new block of buildings has been erected, comprising meter and governor house, with workmen's mess and recreation room above, foreman's office, and meter-testing room, and sulphate works, with stores above. The workmen's room has been much appreciated by the employees, and has doubtless contributed in no small degree to the happy relations existing between the workmen and the management. In addition to the use of the room as a mess-room, the workmen have for the past two seasons been holding pleasant social gatherings on the weekly pay night. The men with their wives and families attend these functions throughout the winter season in full number, and with great regularity. Beyond these buildings is the holder telescoped by Messrs. S. Cutler and Sons in 1905; the work being commenced in September, and the holder converted into a two-lift one before the close of the following month. This piece of smart engineering work was illustrated in the "JOURNAL" already referred to.



The Holder Recently Telescoped.

The meter and governor house contains a 15-inch pressure governor (water loaded) by the Gas-Meter Company, Limited, a cluster of pressure-gauges connected with the various portions of the plant, and a number of the valves controlling the gas-mains to and from the holders. The whole of the work here—including the meter, all the valves, connections, and bye-passes to the meter and governor—was executed to the designs of Mr. Pye by the Gas-Meter Company.

The holder shown was telescoped from a single to a three-lift by Messrs. Cutler last year. The work done including the stripping of the whole of the existing guide-framing and piers, a material strengthening of the tank by wrought-steel bands and stays, stiffening of the outer lift with new additional vertical stays, and the provision of the two new lifts and the whole of the guide-framing. The stanchions are carried down and concreted in at a depth about 2 feet below the bottom of the tank.

The works as now completed are (with the exception of the retort-house, which is under gradual enlargement as required) equal to a production of from 500,000 to 600,000 cubic feet of gas per day. The whole of the building work has been carried out by Messrs. J. O. Holt and Sons, of Chichester; and the retort-house ironwork, foul main, &c., by Messrs. R. & J. Dempster, Limited, of Manchester. The bulk of the engineering constructional work was placed in the hands of Messrs. S. Cutler and Sons; the contracts carried out by this firm including the telescoping and guide-framing of the two holders, the Jäger purifiers, Hunt's washer, the new 25,000 cubic feet exhauster, the underground steel tank for the storage of tar and liquor, the two Cornish boilers, and all the works, connections, valves, &c.

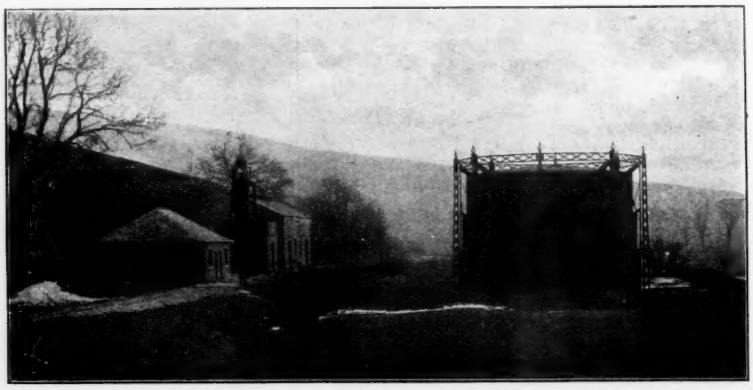
The Exhauster and Governor Rooms.

HATHERSAGE NEW GAS-WORKS.

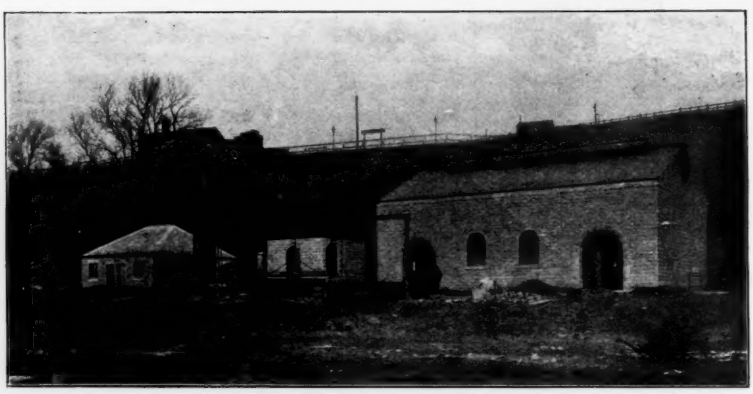
Reference has already been made in the "JOURNAL" to the new works which have been erected at Hathersage, in Derbyshire, for supplying the town, as well as Bamford and the district with gas. We have just learnt that they were successfully started on the 22nd ult., and that on the following evening the railway station was lighted up, and was much appreciated; and there is every prospect of the Gas Company proving a successful undertaking. The whole of the works, including excavation, foundations, buildings, and apparatus, were entrusted to Messrs. J. Firth Blakeley and Co., of Thornhill, Dewsbury, and were carried out by their own workmen, in accordance with the plans and specification of Mr. Thomas Brown, the Manager of the Matlock Bridge Gas Company, under whose supervision they have been completed.

The works have been erected on the rising ground below the down platform of Hathersage Station; and during the excavations and building considerable difficulty was experienced by the Contractors owing to the influx of water from the hillside, particularly during the wet weather which was general during the latter portion of last year. It was also found necessary, on account of the tendency of the rising ground to slide, to build a strong retaining wall at the back of retort-house, and also to re-arrange the position of the buildings from what was at first designed. The works as completed are shown in the accompanying illustrations.

The retort-house is 29 feet span and 52 feet long, and is built of best local rock-faced wall stone, lined with rubble stone 18 inches thick; and a plinth course is provided 18 inches above the ground level. The roof consists of seven steel trussed principals, with ventilator roof over the top, and is covered throughout with best Welsh slates secured to angle steel slating-laths by lead nails. Two semi-circular doorways are provided at the front side of the house, with galvanized corrugated sliding doors fixed on the inside. The retort-settings consist of two beds of five retorts and one bed of three retorts, 21 in. by 15 in., Ω shaped, and are built on the deep generator system. The subway is covered by means of steel joists and concrete, and is paved with fire-brick for a distance of 4 feet from the bench; the rest of the house being covered with checker blue bricks. One end of the house is being used for the storage of coal; and provision is made for increasing the settings when extensions are required. A vertical steam-boiler is fixed in the house to supply steam for driving the exhauster, pumps, &c. The foul main, 8 inches in diameter,



The Site of the New Works.



The Works as Completed.

is continued partly round the inside of the retort-house; and passes through one of the semicircular windows into the annular condensers, two in number, 24 inches in diameter and 16 feet high, with 8-inch valves and connections forming a complete bye-pass arrangement.

The engine-house is built of rock-faced local stone, and is lined on the inside with brickwork. There is an overhead cast-iron tank, divided into three compartments for tar, liquor, and water. A steam-engine and a three-blade exhauster, of a capacity of 6000 cubic feet per hour, are provided, as well as shafting for driving the pumps. These are fixed in a small building adjoining the engine-house, and are belt-driven; and the connections are so arranged that either tar or liquor can be pumped by one of them, the other pumping only water. The water is supplied from a well sunk at one end of the works, into which is led, by means of 6-inch drain-pipes, the water from a spring at the entrance to the works.

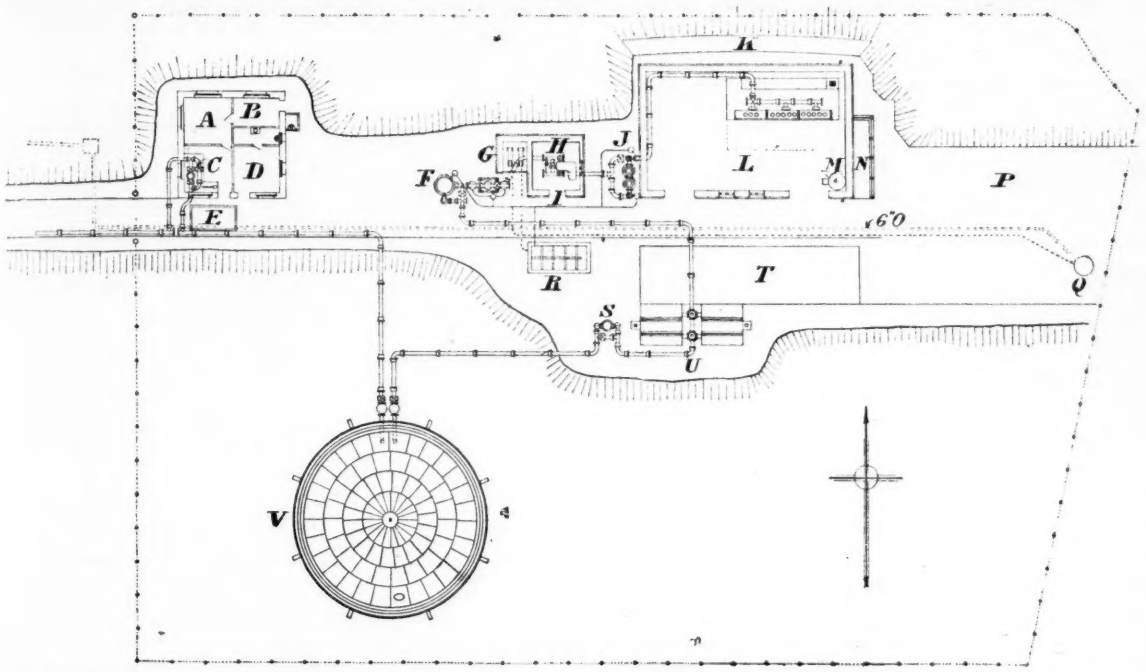
After passing the exhauster, the gas goes through a Cripps patent automatic washer, where the tar and a large portion of the ammonia are extracted. The gas next passes through the tower scrubber, which is 4 feet in diameter and 25 feet high, formed of cast-iron segmental plates with planed joints, and fitted inside with thin wood boards on edge. At the top is provided a water-tank with automatic revolving spreading apparatus, which keeps the wood boards always wet, enabling them to take out the ammonia left after passing the washer. The purifiers consist of two boxes, each 10 feet square, fitted with Green's covers, with apparatus for lifting the covers consisting of a rolled steel joist and travelling pulley-blocks.

After leaving the purifiers, the gas goes through a rotary meter and forward to the gasholder. This is telescopic, the inner lift being 46 feet and the outer one 48 feet in diameter, each 12 feet deep; and the steel tank is 50 feet in diameter, and 12 ft. 6 in. deep. The guide-framing consists of eight lattice standards and girders of substantial and neat design.

The offices and workshops are in one block, built of stone with brick linings. There are four separate rooms—one containing the 8-inch station governor, and also forming a weigh office; another being the general office; and the two back rooms being available for stores and workshop. The roof of the office is of the hipped type, and is entirely covered by slates.

The entrance is from Lead Mills Road, and a roadway about 100 yards long has been constructed along the lower part of the hillside, giving access to the works. The 8-inch mains from the works are under this road, and were fixed by the Contractors up to the gateway. The main laying in the streets has been in the hands of Messrs. H. Gillatt and Sons, of Belper; and the Richmond Gas Stove and Meter Company, Limited, have undertaken the fitting up of meters, cookers, &c.

The Company at present charge 3s. 4d. per 1000 cubic feet to



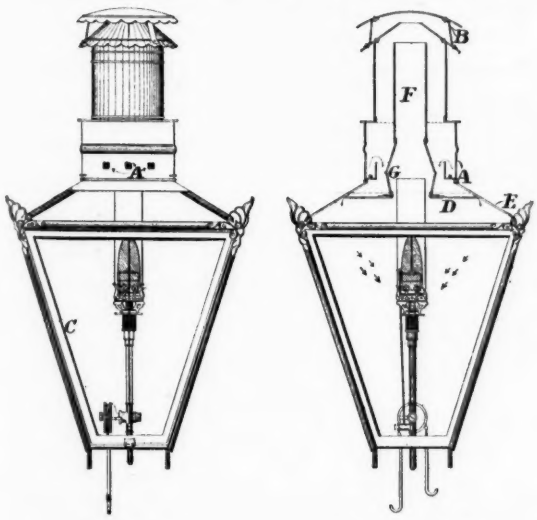
A. Stores and Showroom. B. Workshop. C. Governor. D. Office. E. Weighbridge. F. Scrubber. G. Pumps. H. Exhauster. I. Cripps's Washer. J. Annular Condenser. K. Retaining Wall. L. Retort-House. M. Steam-Boiler. N. Entrance to Subway. O. 6-inch Field Drain. P. Coke Yard. Q. Well. R. Tar and Liquor Well. S. Station Meter. T. Oxide Floor. U. Purifiers. V. Telescopic Holder in Steel Tank.

Plan of the Hathersage New Gas-Works.

ordinary consumers, and 3s. 9d. to those using prepayment meters; but in the latter case the Company put in the fittings free. A large proportion of the consumers have, we learn, preferred these meters. It is hoped, as soon as practicable, to extend the pipes to Hope and the neighbourhood when there will be about 8 or 10 miles of mains supplying gas to this district. Hathersage is a very popular residential place, especially during the summer months, it being practically a suburb of Sheffield.

NEW LIVERPOOL INCANDESCENT GAS-LAMP.

At the close of the notice of the last annual report of Mr. A. G. Smith, the Superintendent of Street Lighting to the Corporation of Liverpool, which appears elsewhere, it is mentioned that he has designed a single incandescent lamp for use in the public thoroughfares. It is storm-proof, and it is hoped its special construction will help to diminish the obstructions arising from



Front View. **Side View, with Top in Section.**

naphthalene deposits, which cause trouble in Liverpool as elsewhere. We give two illustrations of the new lamp, the side view being partly in section. Air enters the lamp by the inlet A, B is the ventilating top, C the cleaning-door, D an enamelled sheet reflector over which the supply of air is obtained for the burner, E an opal glass reflector, F a tube which serves to increase the draught, and G the expansion chamber. Mr. Smith has patented his lamp, the application being dated Dec. 11, 1906; and the Corporation have secured the rights in respect to its use.

HEAT INSULATION OF RETORT-SETTINGS.

A recent number of "Der Gastechniker" contains two short communications on the use of a new insulating material, known as "Thermalite."

According to Herr Braikowich, of Vienna, it is prepared at a temperature of about 1830° Fahr., and consequently is able to resist such high temperatures as ordinarily occur in industrial operations. For jacketting steam-pipes, boilers, &c., it is reported to be highly effective on account of its superior insulating power; to be durable, owing to the method of attachment; and to be very light, since its density is only 0·3. It is made up in shaped blocks, of suitable dimensions for different applications. In the case of pipes, the blocks are in sections, four or six of which exactly fit round the pipe. It is thus only necessary to place them in position about the pipe and secure them by a wire ring. The material is thus far more easily and quickly attached than ordinary insulating materials which are applied layer by layer.

Herr J. Arnold, the Superintendent of the Gaudenzdorf Gas-Works, Vienna, has applied "Thermalite" to hinder the passage of heat from the walls of retort-settings. He introduced into the face of a setting of nine single horizontal retorts, a layer of thermalite, built up of sheets 1¼ inches thick, and over the crown and in the back of the chamber a layer of double the thickness. In the crown, the thermalite layer was laid between the rings of fire-bricks forming the arch and the superposed horizontal courses of bricks. It has been found with this arrangement that the radiation from the face of the setting is greatly reduced, so that both the stokers and the ascension pipes are protected from any excessive heat. There has in consequence been a marked decrease in the number of blocked ascension pipes. The insulation of the arch has the effect of keeping the hydraulic main cooler, so that it fulfils the function of a condenser. Generally, the insulation has resulted in more uniform temperatures being maintained in the retorts. It has not yet been possible to separate the fuel accounts of the insulated settings from those of others; but Herr Arnold hopes shortly to be able to report the consumption of fuel in the furnaces of insulated settings and thus to indicate whether any economy results from the insulation.

O'Connor's "Gas Engineer's Pocket-Book."—We have received from the publishers, Messrs. Crosby Lockwood and Son, the third edition of the above-named work, the text of which has been amended and supplemented by the addition of the statutory regulations for testing the illuminating power and purity of gas, as revised up to August last. We hope to notice the book later on.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR THE YEAR 1906.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money (including premium capital)	27,513,757 11 9	8,245,445 0 0	2,598,057 9 7	38,357,260 1 4
Income—viz.:				
Total gas-rental	3,061,930 16 1(a)	1,209,484 14 9(d)	371,591 15 8(f)	4,643,007 6 6
Rental of meters and stoves	75,298 19 7(b)	122,842 11 8	41,648 3 4	239,789 14 7
Residual products	734,766 2 8	487,489 17 8	96,980 18 1	1,319,236 18 5
Miscellaneous, including old materials	24,821 10 8	16,479 15 9	712 17 10	42,014 4 3
Total income from all sources	3,896,817 9 0	1,836,296 19 10	510,933 14 11	6,244,048 3 9
Expenditure—viz.:				
Coal, oil, &c., including carriage and dues	1,206,276 7 6	681,307 7 1	172,889 17 0	2,060,473 11 7
Purifying materials, including labour	62,703 0 1	25,454 19 0	4,013 12 0	92,171 11 1
Salaries and wages—manufacture	259,877 10 1	142,567 4 0	40,864 12 9	443,309 6 10
Wear and tear—manufacture	396,454 6 1	187,593 2 11	51,515 8 10	635,562 17 10
Rents, rates, and taxes	292,545 17 9	87,931 15 2	25,445 14 1	405,923 7 0
Salaries—management	15,437 16 5	6,915 15 6	2,359 11 1	24,713 3 0
Collectors' salaries and commission	45,389 15 11	28,076 0 4	7,187 12 9	80,653 9 0
Stationery, printing, and general charges	20,145 14 6	23,617 1 4	5,415 11 11	49,178 7 9
Directors and auditors	5,900 0 0	5,259 4 0	2,650 0 0	13,809 4 0
Salaries and wages, wear and tear—distribution	253,427 9 5	87,558 0 9	26,566 1 9	367,551 11 11
Repair and renewal of meters and stoves, &c.	137,912 16 2	95,241 8 4	34,019 6 0	267,173 10 6
Law and parliamentary charges	3,405 18 5	3,823 14 7	949 18 4	8,179 11 4
Bad debts and extraordinary expenses	66,252 3 9(c)	62,088 17 4(e)	10,218 4 6(g)	138,559 5 7
Total expenditure on revenue account	2,765,728 16 1	1,437,434 10 4	384,095 11 0	4,587,258 17 5
Gross profit	1,131,088 12 11	398,862 9 6	126,838 3 11	1,656,789 6 4
Do. per cent. on capital and borrowed money	4 2 2	4 16 8	4 17 7	4 6 5
Do. do. gas-rental	36 18 10	32 19 6	34 2 8	35 13 8

(a) Including £138,411 received for public lighting and gas supplied by contract. (b) Stoves only. (c) Including annuities, £47,887 and £2756 on workmen's compensation account. (d) Including £29,689 for public lighting. (e) Including £14,193 paid to pensions, &c., funds, and £43,962 under the co-partnership scheme. (f) Including £11,934 (less discounts and allowances) for public lighting, &c. (g) Including £5933 paid under the profit-sharing scheme.

TABLE *showing the Capital, Income, Expenditure, and Profit per* 1000 *Cubic Feet of Gas Sold in* 1906.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	All the Companies.
	s. d.	s. d.	s. d.	s. d.
Capital and borrowed money	25 6·46	13 5·00	16 7·39	20 9·04
Income—viz.:				
Total gas-rental	2 10·10	1 11·62	2 4·52	2 6·14
Rental of meters and stoves	0·84	2·40	3·20	1·56
Residual products	8·18	9·52	7·44	8·57
Miscellaneous, including old materials	0·28	0·32	0·05	0·27
Total income from all sources	3 7·40	2 11·86	3 3·21	3 4·54
Expenditure—viz.:				
Coal and oil, including carriage and dues	1 1·44	1 1·31	1 1·27	1 1·38
Purifying materials, including labour	0·70	0·49	0·31	0·59
Salaries and wages—manufacture	2·90	2·79	3·14	2·88
Wear and tear—manufacture	4·41	3·66	3·95	4·12
Rents, rates, and taxes	3·26	1·72	1·95	2·64
Salaries—management	0·17	0·13	0·55	0·16
Collectors' salaries and commission	0·51	0·55	0·18	0·52
Stationery, printing, and general charges	0·22	0·46	0·41	0·32
Directors and auditors	0·07	0·11	0·21	0·09
Salaries and wages, wear and tear—distribution	2·82	1·71	2·04	2·39
Repair and renewal of meters and stoves, &c.	1·54	1·86	2·61	1·74
Law and parliamentary charges	0·03	0·07	0·07	0·05
Bad debts and extraordinary expenses	0·74	1·21	0·78	0·90
Total expenditure on revenue account	2 6·81	2 4·07	2 5·47	2 5·78
Gross profit	1 0·59	7·79	9·74	10·76

TABLE *showing the Increase or Decrease in each Item during* 1906 *compared with* 1905.

—	Gaslight and Coke.		South Metropolitan.		Commercial.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£
Capital and borrowed money	..	20,125	100,000	..	35,969	..	115,844	..
Income—viz.:								
Total gas-rental	65,263	..	14,052	..	14,592	..	93,907	..
Rental of meters and stoves	4,415	..	6,226	..	5,824	..	16,466	..
Residual products	22,291	..	4,367	..	5,184	..	31,842	..
Miscellaneous, including old materials	2,770	..	3,603	..	..	130	6,243	..
Total income from all sources	94,739	..	28,248	..	25,470	..	148,458	..
Expenditure—viz.:								
Coal and oil, including carriage and dues	..	3,878	31,532	..	12,513	..	40,166	..
Purifying materials, including labour	..	25,947	..	12,270	..	5,253	..	43,469
Salaries and wages—manufacture	..	29,259	..	1,587	536	..	..	30,310
Wear and tear—manufacture	29,573	..	..	9,504	..	5,818	14,251	..
Rents, rates, and taxes	..	14,789	5,716	..	3,421	..	..	5,652
Salaries—management	78	..	173	..	116	..	367	..
Collectors' salaries and commission	..	3,468	3,111	..	988	..	629	..
Stationery, printing, and general charges	109	..	2,624	..	1,191	..	3,924	..
Directors and auditors	..	29	120	..	..	..	91	..
Salaries and wages, wear and tear—distribution	17,946	..	..	7,721	3,252	..	13,478	..
Repair and renewal of meters and stoves, &c.	9,693	..	2,450	..	4,883	..	17,027	..
Law and parliamentary charges	..	6,560	..	3,727	..	6	..	10,294
Bad debts and extraordinary expenses	3,253	..	2,945	..	..	443	5,756	..
Total expenditure on revenue account	..	23,278	13,862	..	15,380	..	5,964	..
Gross profit	118,017	..	14,386	..	10,090	..	142,494	..

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following Bills have been read the first time: Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water-Works Bill, Birkenhead Corporation Water Bill, Birmingham Corporation Water Bill, Broadstairs and St. Peter's Urban District Water Bill, Colne Valley Water Bill, Coventry Corporation Water Bill, Devonport Corporation Bill, Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, Heywood and Middleton Water Board Bill, Newquay and District Water Bill, Pontypridd Urban District Council Bill, Portishead District Water Bill, St. Neots Urban District Council Bill, Selsey Water and Gas Bill, Sheffield Corporation Bill, South Lincolnshire Water Bill, Southend Water Bill, Southport, Birkdale, and West Lancashire Water Board Bill, Tees Valley Water (Consolidation) Bill, Tynemouth Corporation (Water) Bill, Wisbech Water Bill.

Petitions have been presented against the following Bills:

Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water-Works Bill, by the West Riding County Council, the Audenshaw and Saddleworth Urban District Councils, and the Limehurst Rural District Council.

Birkenhead Corporation Water Bill, by the Chester Corporation, the Liverpool Corporation, the Anglesea, Carnarvon, Denbigh, and Flintshire County Councils, the Connah's Quay Urban District Council, the Neston and Parkgate Urban District Council, the Wirrall Rural District Council, the Connah's Quay Gas and Water Company, the Wirrall Water Company, the West Cheshire Water Company, and others.

Broadstairs and St. Peter's Urban District Water Bill, by the Kent County Council, the Margate and Sandwich Corporations, and the Eastry Rural District Council.

Colne Valley Water Bill, by the Middlesex County Council, the Bushey, Harrow, Hendon, Ruislip-Northwood, Watford, Wealdstone, and Wembley Urban District Councils, and the Hendon Rural District Council.

Coventry Corporation Water Bill, by the Warwickshire County Council and the Meriden Rural District Council.

Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, by the Great Yarmouth Corporation.

Newquay and District Water Bill, by the Newquay Urban District Council.

Portishead District Water Bill, by the Portishead Urban District Council, the Somerset County Council, and the Bristol Corporation.

Selsey Water and Gas Bill, by the Bognor Gaslight and Coke Company, the Chichester Corporation, and Selsey-on-Sea, Limited.

Sheffield Corporation Bill, by the West Riding County Council, the West Riding Rivers Board, the Doncaster Corporation, the Rotherham Corporation, the Stockbridge Urban District Council, the Rotherham Rural District Council, millowners on the Rivers Don and Little Don, and others.

South Lincolnshire Water Bill, by the Bourne Valley Water Company, the Great Northern Railway Company and the Great Northern, Great Eastern, and Midland Railways Joint Committees, the Kesteven County Council, and the Bourne Rural District Council.

Southend Water Bill, by the Southend-on-Sea Corporation, the Conservators of the River Thames, and the Orsett Rural District Council.

Southport, Birkdale, and West Lancashire Water Board Bill, by the Ormskirk, Lathom, and Burscough Urban District Councils.

Tees Valley Water (Consolidation) Bill, by the Easton, Ormesby, and Southbank and Normanby Urban District Councils, and the Stockton Rural District Council.

Tynemouth Corporation (Water) Bill, by the Ashington and Cramlington Urban District Councils, the Bedlingtonshire Urban District Council, the Morpeth Corporation, the Morpeth and Tynemouth Rural District Councils, and the Northumberland County Council.

HOUSE OF COMMONS.

The following Bills have been read a second time and committed: Annfield Plain and District Gas Bill, Brighouse Corporation Bill, Brockenhurst Gas Bill, Bude Gas Bill, Keswick Urban District Council (Water) Bill, King's Norton and Northfield Urban District Council Bill, Kingston-upon-Hull Corporation Bill, Leeds Corporation Bill, Llandrindod Wells Gas Bill, Metropolitan Water Board (Various Powers) Bill, Penrith Urban District Council Bill.

Sales of Shares and Stock.—A few fully-paid original shares (£6 each) in the Skegness Gas Company, Limited, ranking for a maximum dividend of 10 per cent. per annum, were recently sold at £10 10s. each; some ordinary shares of the same nominal value, but ranking for a maximum dividend of 7 per cent., fetching £6 12s., £6 13s., and £6 13s. 6d. apiece. At the Queen's Hotel, Sunderland, last Thursday, Mr. Atkinson Gibson offered for sale by public auction, in accordance with the announcement made in the "JOURNAL," a nominal amount of £30,000 of additional ordinary capital stock (maximum dividend 5 per cent.), authorized to be raised by the Sunderland and South Shields Water Act, 1891. The stock is entitled to dividend from the 1st ult. Bidding commenced at £118 per £100 of stock, and as the auction proceeded prices ranged from £117 10s. down to £115.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Feb. 20.

(*Before Mr. Justice* PARKER.)

In re Kent County Gaslight and Coke Company, Limited—Company to be Wound Up Compulsorily.

This matter came before the Court again to-day.

Mr. BUCKMASTER, K.C., said he appeared for the Company, and the position was this: It was a petition by J. R. Carmona and others for the compulsory winding up of the Company, in consequence of a series of allegations that were made with regard to its promotion. It was quite clear that a very large number of shareholders had already in the Courts obtained relief from contracts to take their shares, on the ground of misrepresentation in the prospectus; and many more were attempting to secure similar relief. The result would appear to be that it was desirable, in the interests of the Company, to have a winding-up order at once, to prevent any further proceedings of this character. During the past week, the petitioners had—a long while out of time—filed four affidavits of a distinctly acrimonious character, which he should certainly desire to answer if they were going to be read. But if, without reading the affidavits, his learned friend who appeared for the petitioners was willing to accept his consent to an order, he was prepared to give it now; otherwise, if the thing went on, he must ask for time to answer the affidavits.

Mr. JESSEL, K.C., for the petitioners, said he did not want to go into matters of controversy; but the affidavits were not out of time, because his Lordship had intimated that evidence might be filed in reply.

Justice PARKER: Mr. Buckmaster is offering you the relief you ask for on the petition; so I do not think you need trouble. The only question is: Are there any other shareholders supporting or opposing the petition?

Mr. JESSEL said there were about sixty, and a large number of them supported the petition. Some who had repudiated preferred to describe themselves as creditors. Everybody who had given notice supported the petition.

Justice PARKER: I think the best plan will be to make the usual compulsory order.

Mr. BUCKMASTER asked that the affidavits might not be read. He said he objected to having, on the face of the order, a series of uncontradicted allegations of this character. If his learned friend insisted on having the affidavits dealt with, he should have to ask for leave to answer them.

Mr. JESSEL said this would not be necessary. After his learned friend's explanation and what he had stated, he did not think anyone would be entitled to say that the order was made on these affidavits.

Mr. BUCKMASTER: You cannot escape from it, because my observations do not appear in the order.

Mr. JESSEL: I do not think my learned friend's clients will be really prejudiced.

Mr. BUCKMASTER said if costs were the only thing in dispute, the Company were willing that the petitioners should have the costs of the affidavits; but the petitioners apparently wanted the affidavits put in the order, so that they might say it was based on their statements.

Mr. JESSEL: I do not think anybody will say so.

Justice PARKER said they need not be mentioned in the order. The other evidence could be read in it, and then in the order for costs the affidavits could be included.

Mr. JESSEL said he was content with this.

Mr. BUCKMASTER assented; and the usual compulsory winding-up order was made, with costs.

Winding Up the Arnside Gas Company.

It is reported that for some time past matters in connection with the Arnside (Westmorland) Gas Company have not been progressing satisfactorily. The works were partly completed, but have for several months been practically at a standstill. The Company was formed in April, 1905; the nominal capital being £5000, divided into 5000 £1 shares. The amount of capital paid up, or credited as being paid up, was £3316; and an application was entered in the Kendal County Court to have the Company wound up. The petitioning creditors were Messrs. Crossfield Bros., of Arnside, who, when the matter came last week before his Honour Judge Steavenson, were represented by Mr. Mansfield. It was said that the amount of the Company's indebtedness to Messrs. Crossfield was £42 11s. The Company were, stated Mr. Mansfield, now insolvent; and, in addition to Messrs. Crossfield, several shareholders and other creditors had given notice in connection with the winding up. His Honour made the necessary order.

South Luton Gas Company, Limited.—We learn that, as the result of legal advice taken by some of the shareholders in this Company, they have been relieved of the shares for which they applied, and the money paid has been refunded to them.

Stockport Corporation Water Supply.—The Stockport Town Council held a meeting on Wednesday for the purpose of considering the revised Kinder Water-Works scheme. It was decided to proceed with the excavation of the remaining portion of the tongue trench, and to make such trial holes for the wing trenches as may be considered necessary by the Engineers (Messrs. Hill and Sons); the cost of the work, which is to be carried out by administration, not to exceed £12,000. The Engineers were instructed to prepare the plans for the earth dam.

MISCELLANEOUS NEWS.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Question of Candle Power.

The Half-Yearly Meeting of the Liverpool United Gaslight Company was held at the Offices, Duke Street, last Tuesday, under the presidency of Mr. H. WADE DEACON.

The CHAIRMAN, in moving the adoption of the report (which recommended a dividend of 5 per cent. on the ordinary consolidated "A" stock, and 3½ per cent. on the 7 per cent. "B" stock), said he was glad to be able to tell the proprietors that the result of the past half-year's working was quite satisfactory to the Directors. They were now reaping the advantage of the considerable expenditure to which the Company had gone in recent years in improving their apparatus and plant, and they were beginning to see the benefit of the expenditure. He had not the slightest doubt that, as time went on, they would see even greater advantage from it. There had been a small increase in the consumption of gas, which was also satisfactory. The greatest week in this respect was at the end of December—it being the maximum week of the Company for a great many years. It was due to the dark weather and the "cold snap," which came most fortunately for the Company. Further, they had obtained rather better prices for residuals—such as coke and tar. The prospects for the present half year were quite satisfactory; and he thought he was fairly safe in saying that when the accounts were presented at the August meeting, the shareholders would be equally satisfied with the year's working. They were all glad that the trade of the country showed so much improvement, and that prices generally were rising. But still, as Directors, they could not help regretting that, among other things, the price of coal had gone up, because the chief item in the cost of production of gas was the price they were paying for their coal. While the increase did not practically affect them during the present half year, there was no doubt they would have to face some increase in price later. The Directors would, however, watch the matter very carefully; and the proprietors might trust them to exercise their discretion to the best possible advantage and in the interests of the Company. They would, of course, have to pay the price, if they could not get coal any cheaper. Colliery owners for the time being were no doubt going to make their little haul; but the Directors would do their utmost to buy on the most advantageous terms possible.

Mr. J. E. TINNE seconded the motion.

Mr. STEEL remarked that the interests of the shareholders were well looked after; and bearing this in mind, he did not suppose that the increase in the price of coal augured any diminution in their dividends. One matter he wished to mention—namely, that, occupying the position they did, they ought to produce gas as cheaply as possible for the benefit of the great community whom they served. He was not sure whether they did so. He referred to their 20-candle power. He had had something to do with a gas undertaking across the water, where they had only 18½-candle power; and the engineer was of opinion that this candle power might be reduced with advantage, in view of the improvements in incandescent mantles, and also in view of the large consumption for heating and power purposes, which would result if the gas was cheaper. He believed that in Manchester the quality of the gas supplied was 15-candle power. Was it not possible that, by being tied to 20-candle power, as they were in Liverpool, they were obliged to charge the community more than they otherwise would have to do? Was it not a fact that 20-candle power gas was somewhat obsolete, in view of the incandescent mantles that could be used? He would ask if it was not well to consider whether they could not reduce the candle power, and in this way reduce the cost of gas, without impairing the efficiency of their service.

The CHAIRMAN replied that the Directors always remembered they had not only the interests of the shareholders to consider, but those of the ratepayers. The matter referred to by Mr. Steel had been constantly before them, and had led to an endeavour to reduce the price of gas. For the past eighteen months, they had sold gas at the rate of 2s. 6d. per 1000 cubic feet, which was the lowest price that had ever been charged in Liverpool. The question of candle power was a very important one, and had been considered by the Directors from time to time; and he could assure the proprietors that it would be most carefully gone into again. There was no doubt that with the incandescent mantle a high candle power was not so essential as with the old flat-flame burner; but as far as their experiments had gone, if they wanted a certain amount of light, the best thing was to have a high candle-power gas. On the other hand, if they wanted less light, and at a cheaper price, he had no doubt the proper way to get it was to reduce the candle power. They were quite satisfied that, as far as they had gone, they were doing their best for the citizens of Liverpool with their present arrangements; but if there was any general wish to have a cheaper gas, the Directors would be perfectly prepared to consider the question of giving it a trial, and to ask for the necessary authority to lower their present candle power. But going to Parliament for powers was no joke; and the expense of getting a Bill through, in case there was any opposition, would be considerable.

The report was adopted, and a vote of thanks was accorded to the Chairman.

NEWCASTLE AND GATESHEAD GAS COMPANY.

Record Sale of Gas—Coal Prices.

The Annual General Meeting of this Company was held on Wednesday last, at the Offices—under the presidency of the Chairman, Sir WILLIAM H. STEPHENSON.

The CHAIRMAN, in moving the adoption of the report and accounts [which were referred to in the "JOURNAL" for the 12th inst., p. 427], said it had been his good fortune on several previous occasions, to move the adoption of the report; but he had never done so with greater satisfaction than he did that day. There were several things which tended to make the report the most complete and the most agreeable that the Company had ever presented. The revenue from all sources for the year 1906 amounted to £381,004. Of this, £255,694 was received from gas, £95,635 from residuals, £27,833 from rental of meters, stoves, and lamps, and £1842 from miscellaneous sources. The expenditure amounted to £278,963, which left £102,041 as the gross profit for the year. Of this sum, interest upon debenture stock and loans absorbed £18,999, and the intermediate dividend paid in August £40,810, leaving £42,232 to pay the second half-year's dividend of £41,570, and carrying forward the surplus upon the year's working of £562, which, added to the amount brought forward from the previous year, left £18,199 to be carried forward to the present year. The result of the year's working was therefore very satisfactory indeed, when it was taken into consideration that the export coke market was not, during the early months, in a satisfactory state. He was pleased to say, however, that during the later months it was very much better, and, what was still more satisfactory, it continued to be better. The abnormally cold weather abroad during the present winter was an important factor in determining the price of exported coke. The prices of sulphate of ammonia, too, had been below those of recent years, owing to the increased production of the article by the introduction of the new process of coke manufacture at the northern collieries, whereby sulphate of ammonia was now recovered from the coal, whereas under the old beehive process it was not. But the market was improving, as the greater demand for the article was absorbing the increased yield. The manurial value of sulphate of ammonia was becoming more appreciated both at home and abroad; and among new markets that of Japan had become one of importance—the exports to that country having increased from 3600 tons in 1903 to over 33,000 tons in 1906. Tar remained practically stationary in value. Perhaps the use of it for road-making would become so universal that its price would improve a little. Only a very slight improvement was necessary to have an appreciable effect upon their revenue; for an increase of $\frac{1}{10}$d. per gallon would yield them over £1000 a year more. The market price of gas coal was at the present time unfavourable to purchasers. The Company's existing contracts had, however, some months to run; and prices might not be so unsatisfactory when the time arrived for purchasing. There was some satisfaction to be derived from the fact that gas coke followed the fortunes of gas coal, especially in the export trade. He saw in the papers that many of the chairmen of gas companies—some of eminent position—did not hesitate to say, in connection with the high price of coals, that the coalowners had formed a ring or combination in order to bolster up the prices. Now, there was no foundation for these statements. Coal was like any other commodity of commerce. The price of coal, whether for gas making or anything else, was dependent upon the demand; and all the talk and all the legislation in the world would never alter this rule of commerce. They were not in a complaining spirit at all on the Board. They had seen the price of coal very much higher; but, over an average of ten or twenty years, it would be found that the Company—no matter what other companies had paid—had only paid a moderate amount for their coal. The quantity of gas sold in 1906 reached the record total of 2960 million cubic feet, an increase of 72½ millions, or 2½ per cent., over the previous year, which, he ventured to say, was extremely satisfactory. The Company at the end of last year supplied gas to 46,664 ordinary and 45,325 prepayment consumers—a total of 91,989. The growth of the Company's prepayment consumers had been phenomenal. The first installation was supplied on Nov. 12, 1900; and the yearly increases had been as follows: 1900, 168; 1901, 4917; 1902, 8203; 1903, 6153; 1904, 7642; 1905, 8707; and 1906, 9535. During the year, the Company's mains had been extended to supply Dinnington Village, Seaton Burn, and Dudley; and they were being extended to supply Annitsford. About three-fifths of the consumers were supplied with cooking-stoves, which had the desired effect of promoting a day consumption. The Act of Parliament which he referred to in his remarks twelve months ago as being then promoted for the removal of certain statutory restrictions as to sulphur, received the Royal Assent on July 20. The Company were now in the same position in respect to sulphur restrictions as practically the whole of the gas undertakings in the kingdom. He took this opportunity of assuring the proprietors and the consumers that the greatest care would continue to be taken by the Directors to maintain the quality of gas supplied to consumers at such a standard as would leave no ground for complaint. The amount of capital expended during the year was £107,213—£14,909 on buildings and machinery at Redheugh and Forth Street, £59,258 on mains and service-pipes, and £33,036 on meters, stoves, &c. The number of public lamps had been increased by 473, which raised the total to 13,582, of which 5833 were fitted with flat-flame and 7749 with incandescent burners. Of the latter, 1775 were of the self-intensifying type. There were two features in the development of the use of gas at the present time to which he would call particular attention. The first was the increased use of high-pressure gas for the lighting of factories and places of business. This system had been extensively introduced in the large factories in the district, where it had given such satisfaction that its employment was being rapidly extended. The other feature was the use of gas in manufactories to provide high heats for melting metals, tempering steel, annealing, and other purposes. They would perhaps be surprised to hear that heats of over 3000° Fahr. could be easily obtained.

The report having been adopted, dividends for the half year were declared at the rates of 4 per cent. per annum on the preference stock and 4⅝ per cent. on the ordinary stock.

An Extraordinary Meeting was subsequently held, at which the Directors were authorized to create £40,000 of new ordinary stock, and £60,000 of new preference stock, both to rank *pari passu* with the present stock of the Company.

Last Tuesday, at the Swansea Police Court, Alfred C. Richards, a collector, was charged with stealing £1 4s. 4d., belonging to the Gas Company. On the application of Mr. Walter Smith, who appeared for the Company, a remand was granted; bail being allowed.

SOUTH SUBURBAN GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Friday, at the Albion Tavern, Aldersgate Street, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Obren) read the notice calling the meeting; and the Directors' report and accounts were then presented.

THE FINANCIAL POSITION.—CORRECTING A MISTAKE.

The CHAIRMAN said it was his duty to move the adoption of the report and accounts. As usual, the report was as full as the Directors could make it; and, regarding it and the accounts, he thought the proprietors would consider the result of the half-year's working satisfactory. At Midsummer last, the Directors knew there was an increase in the cost of coal; but having obtained their Act, which authorized a reduction of the illuminating power of the gas, the Directors felt it their duty to reduce the price to the consumers by 1d., though they did not expect that, at the price of 2s. 5d., they would quite make both ends meet. The result was there was a deficiency of about £1800 in the half year. But, after paying the dividends, they still had an undivided balance to carry forward, besides which, he would remind the proprietors, they had a very large reserve fund. It now stood at £42,500; and there were very few gas companies, he thought, that in proportion showed a reserve fund so large as theirs. They had also an insurance fund of £15,185; and they hoped to get that up some day to £20,000. But he considered the £42,500 was quite sufficient for a reserve fund. This fund was, at the beginning of the half year, £42,407 odd; and instead of adding the interest as had been the practice hitherto half year by half year, they had, on this occasion, only added £92 odd to make the fund up to the round figure of £42,500, and the balance of the interest had been carried to the revenue account. In the net revenue account would be seen the item "Interest on reserve fund, £459." There was about £1000 a year interest on the reserve fund, which the Directors thought might now be carried to the revenue account, as the reserve fund was quite large enough. As to the question of dividend, he had a mistake to correct. He saw that one or two newspapers had stated that the Company had reduced their dividend. He supposed in these days people had not the time to read carefully what was stated, and thought they had got the sense of what was said when they had not. The paragraph of the report dealing with the dividend said: "With the possibility of a further increase in the price of coal, the Directors do not recommend the payment of the full dividend of $5\frac{3}{8}$, or £5 13s. 4d. per cent., to which the shareholders are entitled under the sliding-scale when gas is sold at 2s. 5d. per 1000 feet." There the Directors did not say anything about reducing the dividend, but continued: "They have, however, no hesitation in recommending the same dividend as the last—viz., at the rate of $5\frac{1}{4}$ per cent. per annum." The dividend was not reduced; and the Directors had no idea of reducing it. If the price of coal should go up to a greater extent than the Board anticipated, then the proprietors could be assured that, if necessary, the price of gas would be raised. But they could increase the price by 1d. without reducing the dividend at all. A penny increase in the price of gas would give them £5500 a year, which would go some way towards helping them to meet the increased cost of coal.

THE PRICE OF COAL.

Now he came to what was really the most important paragraph in the report; and there the Directors made a definite statement: "Reverting to the question of coal, there is a report that a body of Midland gas coal owners agreed, in conference, to put up the price of gas coal 2s. 6d. per ton." This information he might say he had very nearly direct. He had it from a colliery agent who was in communication with the colliery owners. But he had said something on this point at another meeting [*ante*, p. 475]; and it seemed to have excited a certain amount of objection. He did not complain of the coalowners combining. It was the most natural thing they should do so. He did not say the coalowners had formed a ring, or an absolute contract with each other. But they had talked the matter over, and had agreed that they could get an extra 2s. 6d. per ton for gas coal. The northern coal owners met together on Quayside, on 'Change, or wherever they transacted their market business, and talked over matters. And he had been repeatedly told that if a coalowner accepted a price a little under what was supposed to be the rate, he would not like to appear on Quayside. At the time of the last coal boom, in 1900—the coal owners, not in the Newcastle district, who were supplying an important gas company, put their heads together, and agreed to a certain price. The general manager of that gas company, finding this out, gave the go-by to everyone of those coal owners, and went to people outside those who had hitherto supplied the Company for their coal requirements. One did not complain so much of agreements among the coal owners; but what one did complain of was—gas companies being the best and most constant customers for this class of coal—these frequently recurring booms. It was said by a correspondent in a newspaper that these booms were to enable the coalowners to make both ends meet; and the same writer said that, over an average of years, they had only paid 5 per cent., or something like that, which was more than gas shareholders received. He (Sir George) had no doubt the coal owners did not get less than that. But these frequently recurring booms in the price of coal were very unsettling. The first one happened in 1872, and lasted five years before the price went back to its original figure. Then there was another rise in 1890; and that continued three or four years. Then the price went back again. Between 1870 and 1890, the lowest priced coal, free on board, as bought by a London gas company, was 6s. per ton. In 1893, the price went back to 6s. 3d., and in the succeeding years it was at that price and 6s. $4\frac{1}{2}$d., 6s. 6d., and 6s. 9d. Then there came the rise in 1900, and in the last five years they had not returned to the old figures. The lowest price was 7s. 6d.; and he certainly thought 7s. 6d. was a fair price for coal. But before it had time to get back to 6s. 6d. or 6s. 9d. per ton, up it went again, and now they were threatened with another serious advance—which would be very detrimental indeed to the use of gas as a fuel. The increase in the price of coal would also be detrimental, because it would check its use in manufactures. He felt strongly on this point, because cheap fuel was as important as cheap bread to this country. Coal was the capital of the nation; and all industries and trades wanted cheap fuel. But now it was dear. There was no doubt the foreign demand had most materially helped to put up the price. The coalowners were also saying that in the Midlands there had been a difficulty in regard to railway conveyance. Well, this had been overcome. There was no doubt that, when an increased demand arose, and when there was a threatened increase in the cost of coal, the householder was liable to get into something very like a panic. He ordered coal in the fear that it would go higher, and he ordered it in increased quantities. The merchants could not supply the glut of orders; and railway companies could not carry the coal. But from the Company's own experience, the railway companies were meeting this difficulty. Then there was another trouble—that was with the coal miners, who as soon as they found the price of coal was rising, restricted the output. He was told by a coalowner about a week since that when the miners got a 5 per cent. advance, they began to restrict the output, and claimed another 5 per cent., and so on. It was a very serious thing, this constant difficulty between the coalowners and the miners. They seemed to be pulling against one another. He (the Chairman) was once at a meeting at which labour questions were being discussed, and mentioned the circumstance of certain gas companies when they found they could not get sufficient labour at the wages paid, raising the wages voluntarily, and so obtaining all the labour they required. The Secretary of one of the important Unions in the North—an able man, and now a Member of Parliament—hearing this statement, said: "If we had anything like that in the coal trade, we should feel that the millennium was coming." What he (Sir George) understood him to mean was that such a thing never happened as the owners offering an advance of wages; but they went on until they were forced to pay an increase. The two parties were thus continually pulling one against the other. The men, seeing the price of coal going up, restricted the output, and placed all sorts of difficulties in the way, in order to make it go higher, and so get another 5 per cent. But 5 per cent. on their wages did not mean more than 3d. per ton of coal. In the meantime, coal was rising in price. It would, of course, eventually cure itself. It would check trade; and presently coal would come down with a run. But meanwhile a great deal of mischief was being done; and gas companies must resist to the utmost the extraordinary demands that were being made for increased prices. Reverting to the question of the coal miners, when wages increased, working less time. He had heard this repeatedly from coalowners; and statistics showed it to be so. Every increase in wages meant a decrease in production per man. He (Sir George) had once asked a coalowner how this came about; and he said that, ordinarily, a year ago, about 10 per cent. of them stayed away from work. Then, on getting a rise of wages, 20 per cent. absented themselves in December last, and now it was 33 per cent. On an average, they were working 4 days a week, instead of 6. If a man was pressed, he said: "What is the use of my working six days, when I can earn £2 in four days. I am content with that; and therefore I shall not work." This same coalowner also said it was not much use summoning the men, because as one man said: "If you issue a summons against me, I shall leave you to-morrow, and will go to another colliery, where they will allow me to work two days a week if I like." In such cases, increased wages did the men no good. If, when times were good, they got larger wages, and would make use of them to establish their position and become owners of property, things would be altogether different. But it was no use talking about that, because very few employers would take measures to help the men to become property owners. However, the Directors would do the best they could to get coal as cheaply as possible, and to avoid increasing the price of gas. As they had reduced the price whenever they could, the public would, when there was the necessity for an increase, recognise it, and pay without complaint.

RELATIONS WITH THE LOCAL AUTHORITIES.

The next paragraph in the report dealt with their relations with the local authorities; and what the Directors were able to state would be regarded as satisfactory. Happily, all the Company's difficulties on the score of parliamentary regulations and restrictions were over. They were now able to manufacture without anxiety or difficulty gas that was satisfactory to their consumers. The companies had induced Parliament to relax the old conditions; and as the Directors said in the report: "They [the new conditions] appear to have given general satisfaction, neither consumers nor local authorities, nor the inhabitants of the neighbourhood of the gas-works, making any complaints of the altered conditions." The Company were supplying gas well above the standard of illuminating power—in fact, more than a candle in excess. The Directors felt they were taking a heavy responsibility in carrying on this contest in Parliament for four succeeding sessions; but they were now able to say the justification of their determination was in the fact that they had got all they wanted, and everything was satisfactory.

CONSUMERS AS SHAREHOLDERS.

There was another satisfactory point in the report. The Company had adopted the principle Parliament had authorized, of offering stock at the market price to the consumers. In September last, the Directors offered to the consumers £30,000 of ordinary 5 per cent. stock at £124 per cent. (which was then the market price); and the whole of the amount had been at once taken up. He did not know whether any of the proprietors read the Engineering Supplement of "The Times." In last Wednesday's issue, there was the best article he had ever read on the question of the relation of Capital to Labour; and his friend the Deputy-Chairman (Mr. Robert Morton) had made the same remark. The article was by Sir Benjamin Brown, who was connected with the second largest engineering establishment on the Tyne. Sir Benjamin said that the greater proportion of the capital of the great undertakings of this country was subscribed by the middle classes, who were not wealthy. That was quite true in the case of the railway companies, for no less than 60 per cent. of the shareholders of railway companies each held less than £500 of stock. Sir Benjamin explained that there were several classes of shareholders; but the best classes of shareholders any company could have were these two: Shareholders among customers, and shareholders

among employees. Mr. Ohren had got out a statement referring to their own shareholders. There were in all 1639 proprietors; and of them 488, or nearly one-third, were consumers, and 449 were employees, so that these two classes were getting on for two-thirds of the total. The consumers and employees were interested in the Company in a double sense; the latter in a treble sense. The consumer was interested as a proprietor as well as a consumer; and the employees were interested as proprietors, consumers, and workpeople. This, he thought, was an exceedingly satisfactory condition of things; and if this practice of inducing consumers and employees to become shareholders in the companies in which they were interested were extended, it would be a great benefit all round. In their own case, through their co-partnership system, they did not now ask their employees of all ranks to do the best they could for the Company. They had got past that; and they now said: "It is your duty and your interest to do the best you can for the Company. You have your savings and property invested in the Company; and you are bound to do your best for it." The men were feeling this; and it was inducing them to take, as the report said, "a real interest as proprietors in the Company, with which no other interest could be compared." What was wanted to check Socialism and do away with many social difficulties—the unemployed, and so on—was to enable workpeople to become property owners. Employers could do a great deal towards this; but employers must take the initiative. If they would do their part, the employees would respond in the right spirit. He was glad to say in their Company they had taken co-partnership as far as they could; and its continued success must depend upon the employees.

CO-PARTNERSHIP HEREAFTER.

He was talking with a statesman—a member of the Government—a few days since on the question of trying to induce other gas companies to adopt the system; and that gentleman said: "You will never get others to adopt it; and so far as your own Company is concerned, it will drop as soon as you are gone." He (Sir George) did not believe it would. If this were his feeling about it, he would not take any more trouble on the subject. He believed it was now established on such a firm footing that it could not be dropped. But this he did recognize, that it would depend entirely upon the employees whether or not it was continuous. As he said, they had carried co-partnership as far as they could—to the participation of the employees in the management. They had with them as Directors that day two of their employees, one a bricklayer and the other a carpenter. There had been a fear that working men would not elect good men for Directors. He was there that day to contradict this. Two better Directors than Mr. Waller and Mr. Wyllie could not have been found in the whole staff of the Company. It was Mr. Waller's turn to retire; and within the last two or three weeks, he stood for re-election. There were a number of men qualified to stand as Directors; but only one ventured to oppose. The voting was perfectly free and fair, being by ballot; and the result was 637 votes for Mr. Waller's re-election and 108 votes for his opponent, or about six to one. This showed two things—that the men appreciated the seriousness of their duty in voting for a representative on the Board. It also showed that, when the men had a good man to represent them, they meant to stick to him. This being so, he thought they could all feel certain this system was thoroughly assured. At any rate, everything depended upon the employees themselves; and he for one was not afraid of their faithfulness to co-partnership in the future.

Mr. CHARLES HUNT seconded the motion.

A SHAREHOLDER'S APPRECIATION.

Mr. JOHN BORASTON remarked that the report then submitted, the details of which had been so clearly explained, possessed the great merits of brevity and simplicity. Its character was such as to confirm that confidence which the shareholders had always entertained in their Directors. At the meeting held in August last, when the reduction in the price of gas of 1d. per 1000 cubic feet was announced, the Chairman, referring to the then recent alteration in the sliding-scale, pointed out that they would be entitled to a dividend of £5 13s. 4d. per cent., instead of £5 10s., as was formerly the case, so long as the reduction continued. But Sir George was very careful to avoid making any promise; for, as he wisely observed, he did not know what was going to happen. Their Chairman had told them that he did anticipate that the growing boom in trade would necessarily lead to an increased consumption of coal, and a consequent advance in price; and they had reason to suppose, also, that the law of averages brought a severe winter into his anticipations. But he had taken them so far into his confidence as to admit that he had no sufficient reason to anticipate that the price of coal would reach its present abnormal height. He (Mr. Boraston) said "abnormal," because, as the Chairman had just pointed out, there was nothing in the growth of home industries, or in the increase of exports, or in the severity of the weather, or in the congestion of coal-trucks on the lines, to account for this increase. Sir George had said that he had reason to believe it might be due to some agreement—he said a fair business agreement—on the part of the coal proprietors. If there was an agreement, it was a somewhat difficult matter for the Board; but it seemed that a greater difficulty was that connected with the limitation of the output by the miners themselves.

The CHAIRMAN: Quite so.

Mr. BORASTON (continuing) said if it was a mere matter of combination, he supposed coal consumers could combine also; but with regard to the other difficulty, it would appear that the only remedy was to be found in the extension of the system of co-partnership which had been so happily introduced in the case of their Company. Whatever considerations were present in the minds of the Directors when the reduction in price was made, he was sure that, as experienced business men, they knew the troubles must be of a temporary nature only, and that the permanent character of the economies in working which had been introduced in consequence of doing away with useless purification and the disuse of lime, justified them in the course they then took. If he might venture to say so, he entirely approved of this reasoning; and he was convinced that the meeting would heartily endorse the action then taken. It was true that they had not succeeded in earning the £5 13s. 4d. per cent. to which they were entitled; but the Directors, in maintaining the dividend of £5 10s., had achieved a result of which they might be proud, and with which the shareholders had every reason to be fully satisfied. For himself—he was speaking merely as an individual shareholder—he was fully satisfied. He recognized with gratitude the devoted care and the business capacity of the Board; and he was proud to be a co-partner in an enterprise which that day stood before the whole world as a pioneer of a plan for the solution of the great problem of the relations of Capital and Labour. They knew quite well that the interests of employer and employed were one and indissoluble; neither could profit at the expense of the other for any length of time. The difficulty hitherto had been to find some scheme which, while being just, would be satisfactory. Sir George had reduced to practice a scheme which appeared before almost Utopian. His plan went further in the direction of true social reform than anything they were likely to get from Parliament. It supplied the best possible incentive—that of personal interest, of the hope of self-advancement—to increased effort on the part of every worker. The money expended annually in connection with this co-partnership scheme was a most valuable investment, and one that brought a return which, if measured in terms of increased efficiency of working, brought a direct pecuniary benefit to every shareholder, whether a working or a sleeping partner; and which, if measured by the higher standard of the relations between man and man, tended to raise employer and employed to a common platform of understanding and goodwill. They had to thank Sir George Livesey for this; but it was, after all, one only of the matters for which they had to thank him. They had also to thank the Directors, officials, and workpeople for the loyal support they had always given him, which had enabled Sir George to present so satisfactory a report that day. The termination of the long parliamentary struggle had been due in part to the efforts of the Beckenham Urban District Council. This Council were fortunate in possessing for their Clerk a gentleman of unusual energy, ability, and force of character. He did not know to what extent this gentleman's advice had been responsible for the result which had been so happily achieved, but he was quite prepared to believe that it was very considerable. But he did know that the amenities of his (Mr. Boraston's) house, which overlooked the works, had been increased by the abolition of lime purification; and he also knew that the gas supply, both for lighting and heating, did not appear to have been in any way deteriorated by the reduction of the candle power. Therefore he judged that Council and Clerk had acted wisely. When referring to the lighting power, he had in mind, not only the domestic supply, but also the lighting of streets and open spaces. There were to be seen near Beckenham Station three kinds of lamps—electric arc, electric incandescent, and gas incandescent. The electric incandescents, however, were not lighted before midnight, when the arc lamps were put out. They were very poor. The arcs gave a very vivid illumination in the immediate neighbourhood of the lamps, but the area was limited and very sharply defined. The gas incandescent lamps gave a clear and well-diffused light which to any ordinary observer appeared to be infinitely better suited for outdoor illumination. Therefore he was inclined to believe that the use of gas for outdoor purposes was by no means at an end.

The CHAIRMAN said he thanked Mr. Boraston for his speech, and especially for the part in which he referred to the employees. He believed their system might be adopted by the railways; but he thought the Railway Boards were afraid to suggest it to the shareholders—fearing that it might possibly reduce dividends for a time by about ¼ per cent. His experience, however, both with their Company and with the South Metropolitan Company, had been that the shareholders were ready to help the workpeople to improve their position. He was also very glad to hear the remarks about the gas—particularly with regard to the incandescent lighting. Here he might say a word for Mr. Shoubridge. Both he and his men took a pride in maintaining the incandescent gas-lamps in as perfect a condition as possible.

The resolution was then carried unanimously.

DIVIDEND.—RE-ELECTIONS.—VOTES OF THANKS.

The DEPUTY-CHAIRMAN (Mr. Robert Morton) proposed the payment of dividends for the half year at the rate of 5 per cent. per annum on the preference stock and of 5½ per cent. on the ordinary stock—less income-tax.

Mr. W. G. WALLER (a Workman-Director), in seconding, said the workmen were thoroughly imbued with the co-partnership spirit, and were conscious of the fact that the Company's prosperity was their prosperity. They had done their duty cheerfully and well.

The CHAIRMAN said that, before putting the resolution, he wished to bear testimony to the good service rendered to the Company by the Clerk to the Beckenham Council. He really helped them to secure a satisfactory settlement, and his Council backed him up. As to the dividend, there was no doubt whatever—unless an earthquake or something of the kind occurred—that they would earn it in the current six months without raising the price of gas. They were safe for the next half year at any rate.

The motion was carried.

Sir J. FORTESCUE FLANNERY, Bart., said they had now reached the resolution of the afternoon. However important might be the adoption of the report and the declaration of the dividend, they were certainly not more so than the re-election to the Board of their old friend the Chairman, which he had to propose. With regard to Sir George's services to the gas industry, he would refer to the latest—namely, the abolition of the sulphur restrictions. Though they might have reached this goal years hence, they certainly would not have reached it for some time but for the special exertions the Chairman put into the agitation This remark applied also to other matters of which he did not propose to speak at any great length. There was one statement in Sir George's opening speech that he could not allow to pass unchallenged. He said that a statesman—a member of the present Cabinet—had prophesied that when he (Sir George) disappeared, the co-partnership system would also disappear. On the contrary, he (Sir Fortescue) believed that every member of the Board would regard himself as personally pledged to carry on the work which the Chairman had initiated, and from what he had seen of the Board of the South Metropolitan Company, he felt sure they would take the same view of it themselves. Above and beyond the mere question of individual support by Sir George's present colleagues, he believed the system had come to stay.

It did not depend now upon individuals. The goodness and soundness of the plan had been well and widely recognized; and the statesman, whoever he was, who made the remark referred to, did not understand the signs of the times. He (the speaker) was fully convinced that he was entirely mistaken in his prophecy. But they hoped Sir George would not drop out for a great many years [Hear, hear], and that they would have the pleasure of re-electing him time after time.

Mr. G. T. POWELL, who seconded, said they were exceedingly fortunate in having such a Chairman, and such Directors. Sir George had not only been most successful in getting the work done as it was and making the men co-partners, but he had always been persistent, with English tenacity, in securing the benefits they ought to derive from their gas. He only wished he could have had his way with regard to illuminating power, so that they could have manufactured their gas without any illuminating power at all. Sir George had said often that the mantle answered all necessary purposes of illumination.

The motion was carried unanimously.

The CHAIRMAN, in returning thanks, said it was a great pleasure to him to be of use in the business. He had not gone quite so far as to suggest no illuminating power at all for the gas [Laughter]; but they could very nearly get to that with the incandescent mantle. He then proposed the re-election of Mr. Charles Hunt as a Director; remarking that he was an ideal member of the Board.

Mr. H. D. ELLIS seconded; and said Mr. Hunt was known everywhere as one of the most eminent gas engineers. Continuing, he remarked that he was entirely in agreement with Sir Fortescue Flannery that the profit-sharing system did not depend on the life of any one man. It would most certainly be continued so long as one thing could be guaranteed—and that was that the men would avail themselves of the opportunity it afforded them. The failure of the men to do this alone could kill it.

The CHAIRMAN: You are doing as well in the Commercial Company as we are; the men are becoming shareholders?

Mr. ELLIS: Capitally.

The proposition having been agreed to,

Mr. HUNT briefly returned thanks for his re-election; and the retiring Auditor (Mr. Thomas Guyatt) was then re-appointed on the motion of Mr. S. WOOD, seconded by Mr. F. W. BROTHERS.

Mr. ELLIS proposed a vote of thanks to the Chairman and Directors; remarking that the management of a gas company did not get any easier year by year, but rather the reverse. There were greater and greater demands every year upon the time, attention, and ability of directors. The ornamental director was "not in it" in these days. They wanted what they had there—thoroughly practical men.

Mr. W. T. WILKINS seconded the resolution, which was carried.

The CHAIRMAN returned thanks, and referred with regret to the absence on account of ill-health of Mr. Jabez Light. He then proposed a similar compliment to the officers, staff, and workmen.

Mr. GUYATT seconded this, and it was carried.

Mr. S. Y. SHOUBRIDGE, the Engineer, thanked the shareholders on behalf of the workmen and the engineering staff, and Mr. OHREN on behalf of the Secretarial department.

This concluded the proceedings.

CROYDON GAS COMPANY.

For the first time, the proprietors of the Croydon Gas Company met last Friday in the lecture room at their handsome new offices in Katherine Street, Croydon. Before and after the meeting, the offices and show-rooms, and the workshops connected with the distribution department were examined. Over their repleteness in appointment and convenience, much admiration was expressed. The offices now rank among the finest of the many fine buildings in the town; and they will, without doubt, bring good influence to bear upon the Company's business. At the Directors' meeting earlier in the day, the staff presented the Chairman (Mr. Charles Hussey, J.P.) with a large life-like photograph of himself, for preservation in the Board-room. The Chairman has endeared himself to all during his long chairmanship; and the sixtieth anniversary of the Company's formation, and the establishment of the work of the Company in the new headquarters, was considered a fitting opportunity for giving tangible expression to the regard in which the staff hold their Chairman.

At the Meeting of the shareholders, Mr. HUSSEY presided.

The SECRETARY (Mr. W. W. Topley) read the notice convening the meeting. The Directors' report and the accounts having been taken as read,

The CHAIRMAN moved their adoption. He said it might be of interest, before speaking of the Company's progress in the past half year, if he reminded the proprietors that, at this one-hundred-and-twentieth half-yearly meeting, they were celebrating the sixtieth anniversary of the Company's formation. It was pleasing to the Directors that, on this anniversary, they could congratulate the proprietors on the fact that they now met on their own premises, instead of, as for several years past, at varying and less convenient places. At recent meetings he had referred to the extensions of the offices and show-rooms which had been forced upon the Directors by the growth of the Company's undertaking; and he had said that the new buildings would be found, when completed, to be well adapted to the Company's clerical requirements, and to the convenience and education of consumers. The proprietors would, he hoped, agree with him that these forecasts were justified by the buildings they had now commenced to use, and that the Company's present offices did no discredit to the town that their business was so intimately connected with. In place of cramped, they would now have ample, provision for the needs of the staff, and for the samples they would display of appliances for the many uses of gas to the best advantage. He had no doubt that these improved conditions would be reflected alike in their clerical and advertising work.

THE PROGRESS OF CONSUMPTION.

It would be seen that the sales of gas showed an increase over a year ago of more than 6½ per cent. This increase represented in quantity above 28 million cubic feet in the six months, and compared with an increase in the half year to December, 1905, of 3½ per cent. He would give in round figures the Company's sales for four periods—each ten years apart—in order that the proprietors might see how steadily and surely had been the progress. In 1876, the Company sold 180 million cubic feet; and in 1886, 340 million. Although in the early nineties the industry began to feel the competition of electric light and of cheap oil for household use, they found that in 1896 the sales had grown to 593 million cubic feet; while in the year just ended they amounted to 1105 millions. In the past half year, during the severe weather which followed Christmas, the largest output recorded in the Company's history for any one day was reached—viz., 5,030,000 cubic feet. It was also interesting, as showing to how large an extent the consumption of gas was in these days of gas-fires affected by the weather, to note that on one cold day last month when the temperature was 16° lower than the corresponding day a year ago, there was an increase of 30 per cent. in the output. The proprietors would have no difficulty in seeing, in face of the possibility of fluctuations in demands so great as this, how imperatively necessary it was nowadays that a gas company should have an ample margin of manufacturing plant beyond immediate average requirements. During the half year they had added to the number of consumers by 1014, and to that of stoves on hire by 789; and they had further sold 247 stoves outright to consumers. If the comparison was made with a year ago, the increase became in consumers 2125, and in stoves on hire 1386.

NEW WORKS AND REPAIRING SHOPS.

The new stove and meter repairing shops at Waddon were complete. They had been in operation some time now; and the results secured were very satisfactory. He should perhaps mention that they would repair there not only stoves and meters, but also the fittings let on hire to prepayment consumers. Large numbers of these fittings passed in and out of the stores; and the Directors hoped to effect an appreciable saving by being able to make as good as new, and use again, fittings that previously would have had to be condemned and sold as old brass. They had for some years past been faced with the difficulty that, during the winter, large stocks of cooking-stoves accumulated in the stores, and that these, owing to the insufficiency of the Company's facilities for storing, cleaning, and repairing them, could not be got ready beforehand for the spring and summer demand. Thus in the past they had either to keep consumers waiting or to purchase new stoves at a considerable sacrifice. The facilities for cleaning and repairing would enable the Company to turn the stoves out equal to new. The new section of washing, scrubbing, and purifying plant at the works was nearing completion; and the larger part of the capital expenditure during the half year had been upon this extension.

INCREASES IN REVENUE EXPENDITURE.

Turning now to the revenue account, there was a very considerable increase under the heading "Repairs and maintenance of works and plant." The expenditure last half year in this direction had indeed been exceptionally great; but it was not of a character that the proprietors need view with apprehension. Much of the increase represented alterations and improvements that would not recur for some time. It would be readily seen that when, in an established works, much enlargement and constructional work was going on, there went with it much adaptation of existing plant to the new conditions; and expenditure of this kind (though much of it had been of the nature of improvement) had been fully debited to the revenue account. The other large increase on the expenditure side was on coal and oil. He told the proprietors in August last that the Board estimated the extra expense, through advancing prices, of these materials at about £6000 for the year 1906-7, but that they hoped, in large measure, to be recouped by an increased return from coke and other residuals. This, it would be seen, had been realized; and in point of fact, while the increase in the output of gas had been upwards of 6½ per cent., the increase in the cost of raw material, after allowing for the improved yield from residuals, had been less than 5 per cent. He was pleased to say this half year promised a similar, if not better, result. There could be very little doubt that when they had to go into the market to buy coal for delivery after June of this year, when their contract expired, they would have to pay prices higher than those at which they bought last spring. While they all regarded it as reasonable that, in times of industrial activity such as this, coal should tend to rise, the Directors believed that the present ideas of the sellers of coal were somewhat inflated, and he thought that, as the year progressed and the cold weather demand (of late very heavy) abated, more reasonable counsels were likely to prevail. Meanwhile the Directors had been able to secure oil enough for their requirements for more than a year to come, at a price not much higher that that of their last contract. Should their expectations as to coal, however, be disappointed, they could take consolation from the fact that, so far as coal was concerned, they could generally count on a rise in expenditure being, in part at all events, offset by an increase in their revenue. This was an incidental economic advantage gas had over its friendly competitor electricity, in whose revenue accounts there was no place for the pleasing heading "Receipts from residuals."

FURTHER CAPITAL REQUIREMENTS.

It would be observed that it had been decided to again raise capital this half year, and that this would be done by an issue, by tender, of "D" stock. It might be, and he knew was by some, thought that, in the past few years, the capital account had grown rather freely; but he thought a little consideration of the growth of the undertaking side by side with the growth of capital account would re-assure any who felt nervous on this score. It was a truism that at times wise expenditure was the best economy. He had, on several previous occasions, pointed out that the fairest test of the administration of a gas undertaking from this point of view was furnished by seeing how much out of the price at

which gas was sold had been taken for the use of the money employed in the business. He would once more apply this test to their Company. In 1876, the toll levied by capital on the price of gas was 1s. 5d. per 1000 cubic feet; in 1886, it was 1s. 3d.; in 1896, 1s.; and last year, only 1od. He trusted these figures would convince every proprietor that the Directors were not spending capital faster than was absolutely necessary in view of the growth of the business.

The DEPUTY-CHAIRMAN (Mr. T. Rigby), in seconding the motion, remarked that the Chairman had dwelt upon the consumption of gas that had been going on during the past half year; and it would be agreed that it was very satisfactory. When he (Mr. Rigby) said there were upwards of 2500 houses now empty in Croydon, it would also be agreed that when these houses were filled there would be a still larger gas consumption.

Replying to an inquiry, the CHAIRMAN stated that a larger quantity of gas had been manufactured at a less cost. This was due to the bringing of the new machinery into use, and to much better carbonizing results.

The motion was carried.

THE COST OF CAPITAL.

Mr. CORBET WOODALL moved the declaration of dividends at the rates per annum of 14½ per cent. on the "A" stock, 11½ per cent. on the "B" stock, 10¾ per cent. on the "C" stock, 5 per cent. on the "D" stock, and 10 per cent. on the "E" stock, all less income-tax. He said one could not help feeling, meeting in their new offices, that they had reached a period in the history of the Company that called for such a review as the Chairman had given of the history of the concern. He had no doubt whatever that the feeling in the minds of many proprietors was that the new block of buildings, the great block they had built at Waddon for dealing with stoves, meters, and so forth, and the great extensions of the works, had together meant a very large expenditure of capital, and it might cause some qualms as to the future. He thought the Chairman fully dealt with this by pointing out how the charge for capital had been a constantly reducing quantity. He (Mr. Woodall) had asked Mr. Helps to give him a statement of the capital in relation to the business during the period of 20 years. Taking 1881, the capital per 1000 cubic feet of gas sold was 15s. 8d.; and in 1890, it had fallen to 10s. 6d. This was a reduction of about 50 per cent. In that year, they bought the Carshalton works, with the result that the capital went up to 11s. 10d. It fell again to 10s. 3d. (which was less than the amount in 1890) in 1904. Then they bought the Caterham works; and in this case, as in the case of Carshalton, what was bought was not simply the gas-works but the goodwill of a prosperous business. This put the rate of capital up from 10s. 3d. to 11s. 6d. That was last year; and this year they were down again to 10s. 10d. He had no doubt that in a couple of years, they would be as low as, if not lower than, they had ever been before. He thought it was very encouraging to know that, however rapidly they were spending capital, they were only spending it for productive work; and, this being so, the more they spent the better. [Mr. Woodall then illustrated the necessity for the expenditure of the money on the extension of the offices and shops by quoting figures as to the number of stoves and meters handled.] Both in capital expenditure, and in the work of fixing, maintaining, and repairing meters, stoves, and fittings, the charges upon the Company were now very heavy. They were kept up to the highest level of the knowledge of the day by their Engineer; and their works were in most thorough order. By not allowing the fear of reducing the net revenue or profit to interfere with the full maintenance of the undertaking in the highest state of efficiency, not only did they maintain their position, but they increased their business largely, and the tendency of the price was downward.

Mr. W. CASH seconded the motion; remarking that, although the dividends might sound high, it must not be forgotten that they had (excluding premiums on loan capital) close upon £120,000 premium capital on which no dividend was paid.

Moved by Mr. PERCY H. HALL, and seconded by Mr. A. W. OKE, Mr. Hussey was re-elected to his seat at the Board; and Mr. Samuel Spencer was also returned, on the motion of the DEPUTY-CHAIRMAN, seconded by Mr. COLMAN.

The retiring Auditor (Mr. J. Jones) was also re-appointed.

Before separating, the proprietors passed hearty votes of thanks to the Chairman and Directors and to Mr. Helps and Mr. Topley. Many kind and well-deserved things were said as to the work of the Board and the chief officials; and recognition was also particularly made of the work of the Assistant Engineer (Mr. Caddick), the Distributing Superintendent (Mr. Sandeman), the Assistant Secretary (Mr. Anderson), and the Rental Superintendent (Mr. Haines). The clerical staff and workmen were also praised for their diligence and loyalty. Referring to the question of the large extra quantity of gas made at a reduced cost, and to the statement of the Chairman that this was largely due to the use of machinery, Mr. Helps said he should like to add that the intelligent use of the machinery by the men had also done much for them. Many of the workmen were shareholders, and he saw some present at the meeting. They would, he was sure, convey to their comrades the appreciation of the proprietors. An acknowledgment by Mr. Topley concluded the proceedings.

The West Riding Rivers Board and the Sheffield Corporation Bill.—At a recent meeting of the above-named Board, the Bill promoted by the Sheffield Corporation to obtain further powers in respect of their water undertaking was under consideration. It was resolved that unless the Corporation agreed to amend the Bill in regard to compensation water, the Clerk and the Solicitor should act on the previous instructions of the Board to oppose, and that the West Riding County Council should be invited to co-operate with the Board so as to secure a continuous discharge of compensation water during each day of 24 hours. It was urged that the primary duty of the Board was to purify the rivers, and to leave the Corporations to deal with the water-works schemes. It was stated on the part of Sheffield that there was no likelihood of the Corporation coming to an amicable arrangement with the Board, so that the matter would probably have to be fought out before a Parliamentary Committee.

TOTTENHAM AND EDMONTON GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held on Saturday at the Offices, No. 639, High Road, Tottenham—Mr. CORBET WOODALL in the chair.

The SECRETARY (Mr. E. Topley) read the notice calling the meeting; and the report and accounts were taken as read.

FURTHER REDUCTION IN THE PRICE OF GAS.

The CHAIRMAN, in moving the adoption of the report and accounts, said the record of the half-year's work had again proved satisfactory. They were now practically at the end of the winter season; and he was able to say that the supply had been maintained in a perfectly satisfactory manner over the whole of the Company's very wide area. The price charged during the half year had been less than in 1905 by 2d. per 1000 cubic feet, which meant a difference in revenue of about £5000. It had again been found that the amount so surrendered to the consumers had been more than returned to the Company in the form of increased consumption. Although a greater demand did not invariably follow upon a reduction in price, yet there was no doubt it was stimulated thereby, and especially by the feeling engendered among consumers that the tendency of the charge for gas was steadily downwards. He was exceedingly glad to intimate that day a further reduction in price. This was the third time within four years it had been his pleasure to make such an announcement. From Christmas, the price charged to ordinary consumers had been 2s. 6d. per 1000 cubic feet, with discounts varying with the quantity consumed, and also in the case of gas used for power. As the proprietors were fully aware, seeing he had had to refer to it so often, the Directors had had to expend large sums year by year in the renewal and reconstruction of works. These would be less burdensome in the immediate future, and for this reason, as well as because of improvements in manufacture, though they knew some charges would be heavier after midsummer, they had made the reduction without fear.

THE RELATION OF CAPITAL TO BUSINESS.

The capital expended in the half year amounted to £26,370, of which £11,611 was for additional land. The land in question was that of which the Act of last year authorized the purchase. As soon as the resolution was (taken early in 1905) to proceed with the application to Parliament for further capital and other powers, the Directors instructed an agent to purchase the lands required, including Willoughby Farm. At the same time, pending the passing of the new Act, they had no right, as a Company, to hold the lands; and therefore the necessity for their purchase by the Directors personally, and their subsequent transfer to the Company. This (as the report had announced) had now been fully accomplished. The relation of capital to business done—notwithstanding the large expenditures, and the outlay during the year of upwards of £11,000 on land, which was at present unproductive—continued very satisfactory; and the charge per 1000 cubic feet sold for dividend and interest was less that day, he believed, than it had ever been in the history of the Company. Going back some fifteen years, the amount then paid in dividend and interest, although at a lower rate per cent., represented 10½d. per 1000 cubic feet upon the gas sold; to-day, he was glad to say, it was 6·27d.

POINTS IN WORKING AND GENERAL PROCEEDINGS.

The proprietors would have seen from the report that there had been an increase of nearly 10 per cent. in the quantity of gas sold in the half year, as compared with the corresponding period of 1905. This increase had been supplied chiefly through prepayment meters, of which there were now in use in the district 27,035. The new retort-house (which the shareholders had the opportunity of inspecting on the occasion of their visit to the works in the autumn of last year) had been in operation during the year, and had been the occasion of considerable saving in working expenses. The price of coke had been good; and in order to have more for sale at the better price, they had made less carburetted water gas. This adaptability to circumstances was not the least of the attractions of carburetted water gas. Putting together the costs of coal and oil, and deducting receipts for residuals, there was a reduction in the net cost of materials of £1400, although the price per ton of coal was higher, and the quantity of gas sold had been greater by 55 million cubic feet. He thought this was very strong testimony to the way the operations had been conducted at the works. The expenditure upon repairs and renewals had again been very heavy; but, as he had already said, the works of reconstruction were now, for the present, practically completed. Another special and somewhat heavy item of expenditure, which they hoped would not recur for some time, was that of parliamentary charges. They obtained in their Act of last year an ample return for the labour and cost expended in procuring it. The opposition to the London Outer Circle Railway was another matter. The Directors were not opposed to the scheme of the railway on principle. Indeed it was to the Company's interests the scheme should be carried out. They were obliged, however, to press for certain works on approach roads, so that their lands should not be isolated; and these were only settled on the eve of the defeat of the Bill. He was pleased to say the Company's relations with the Local Councils and the consumers were friendly. Everything was done by their officers and workmen to ensure the best service possible, both to the private consumer and to the public lighting. They had now discontinued making any charge for the time of the men employed in attending to the consumers' burners, mantles, and fittings; the only charge made being for materials actually supplied. An event of great interest in the story of the Company which occurred at the close of the half year, was the retirement of Mr. Randall from the position of Secretary. This would be the occasion of a special resolution later, so he (the Chairman) would make no further reference to it here, nor yet to the selection of his successor. The works were now in excellent order; and the Directors would probably invite the shareholders to hold their autumn meeting there again this year. A special purchase of land had been

made to the north-west of their property, giving access to Angel Road and the district thereabouts.

THE COAL QUESTION—THE REGULATION OF PRICES.

He had already said that their expenses after midsummer would be increased. There was no doubt they would have to pay more for coal when their present contracts expired, though they had purchased a portion of the supply for 1907-8 at the price current six months ago. He thought the present position of affairs with regard to the coal supply was deplorable. Trade was good, and the demand for coal consequently large. These were conditions which ensured a reasonably high price. But this was the time chosen by Parliament to take off a duty on exported coal which was yielding a handsome revenue, and causing no inconvenience to, nor imposing any burden upon, any class of the community. The removal of the duty had stimulated export; and this, added to the good trade, had caused the demand to equal, if not exceed, the supply, and so put the question of price largely into the hands of the coalowners for determination. It was not to be wondered at if the temptation to make vast profits was irresistible to men who said they had for years past been doing no more than earning the money to pay wages. In his opinion, the question of coal supply was so grave, the injury to the country and its industries so great when cost became extravagant, that some means should be found to govern prices, and prevent these harmful fluctuations, which alternately caused owners and users to thirst for opportunity for retaliation. As he had said elsewhere, these famine prices brought their own cure; but only at the cost of incalculable loss and great suffering to numbers of people. He knew how difficult it would be to find means and authority to regulate prices. Conceive, however—as an extravagant illustration—a combination of owners to close down pits representing half the output. No machinery existed, he believed, to prevent such a catastrophe. The country could not stand such a crippling of its resources; and would not means be promptly found to recover for the nation the use of what was essential to its life? If this great necessity of the nation was to be in the hands of individual owners, they should be subjected to regulation and control, as was the industry with which their own Company was associated. Prices yielding a fair return to the vendors would be found, on the average of years, more advantageous than one year of immense profit, followed by many years of leanness and of comparative poverty. If it had been found possible to regulate equitably the charges for gas, water, and electricity (which might be called municipal necessities), it should not pass the wit of man to find means to regulate also the price of coal, which was of national and far greater importance. Meanwhile, they must do the best they could. Their action in reducing the charge for gas showed the conviction of the Directors that the high price would soon wear itself out; and while it lasted, gas would displace coal for heating their houses at a rate greater even than in the immediate past.

ELECTRICITY COMPETITION.

Tottenham and Edmonton would very shortly be furnished with a supply of electricity. The competition would probably affect their rate of growth for some little time; but he had no fear whatever as to its interfering with the prosperous career of the Company. They were now established so firmly, and their finances were in so healthy a state, that there were few undertakings, if any, better equipped to face what the future might have in store.

Mr. H. BAILEY seconded the motion, which was carried.

Mr. D. FORD GODDARD, M.P., moved the declaration of dividends at the rates per annum of 6½ per cent. on the "A" consolidated stock, and 5 per cent. per annum on the "B" consolidated stock, both less income-tax.

Mr. G. T. WATSON seconded; and the motion was agreed to.

MR. RANDALL'S RETIREMENT FROM THE SECRETARYSHIP, AND ELECTION TO THE BOARD.

Mr. HASLAM then proposed—"That pursuant to section 54 of the Tottenham and Edmonton Gas Act, 1906, the number of Directors of the Company be increased from five to six, and that the allowance to the Directors be increased accordingly to the sum of £1800 per annum dating from Jan. 1, 1907." Speaking in support of the resolution, Mr. Haslam referred, in many happy phrases, to Mr. Randall's long service to the Company. Among other appropriate passages were these: He said he had known Mr. Randall for over forty years. During the whole of that time, he had found him to be a man of extraordinary wisdom, and of a wide measure of integrity; and, as a worker, he did not know his equal. Mr. Randall had now the satisfaction of finding his labour of 54 years for the Company represented in the resolution he had the privilege to propose.

Mr. ASHMOLE seconded the proposition. He alluded to the great growth of the business of the Company; and expressed the opinion that six Directors was not one too many. He was glad they had this opportunity of retaining the mature experience of Mr. Randall to bear upon the work of the Company.

The motion was unanimously carried.

The CHAIRMAN then moved—"That the action of the Directors in inviting Mr. James Randall to join the Board be approved, that he be, and is hereby, elected a Director of the Company, and that an annuity of £350 per annum be paid to him on his retirement from the office of Secretary." In the course of his remarks, the Chairman stated that during the many years he had been associated with Mr. Randall, he had always found him not simply an admirable officer of the Company, but also a loyal friend and helper. It was a great testimony to any man to have lived in a conspicuous position in the district where he was known necessarily to a large number of the inhabitants, and at the end of that time to find himself held in the esteem and repute in which their friend was held that day. He (the Chairman) desired it to be understood that the retiring allowance now proposed only referred to the period during which Mr. Randall held a seat on the Board. Should he at any time resign the seat, the amount of the retiring pension would be reconsidered. As to Mr. Ashmole's remarks, it must not be taken that the Board would always remain at six. He himself considered a small and efficient Board was preferable to a large one.

Mr. SAVORY, who is the Chairman of the Electricity Committee of one of the authorities in whose district the Company supply gas, seconded the motion, and alluded in eulogistic terms to Mr. Randall's work. He hoped their friend would be spared for many years to enjoy the position he now held on the Board.

Dr. BENJAFIELD added his testimony; and, in a speech of some length, proposed that the retiring pension be £450.

The motion having been seconded,

The CHAIRMAN expressed his regret that the amendment had been proposed. It came to the Directors as a surprise. If anyone supposed that any proprietor of the Company felt towards Mr. Randall a stronger sense of loyalty and kindliness than the members of the Board, he was sure that proprietor was mistaken. The Board had given this matter the gravest consideration; and they had settled terms that were entirely acceptable and pleasing to Mr. Randall. That there should have been introduced into the meeting one word to disturb what he (the Chairman) had hoped would be one of the pleasantest episodes in the history of the Company was to him personally a matter of the greatest regret.

The amendment only received some half-a-dozen votes; and the original resolution was then carried without a dissentient hand being shown.

Mr. RANDALL (who was enthusiastically received) said his words on that occasion would have to be few. He thanked all present most sincerely; and he might say that what had been proposed by the Chairman he accepted cheerfully and with the greatest pleasure. He hoped he might be long spared to serve the Company in the capacity which he had the honour now to fill. Looking back to the period when he first entered the service of the Company in 1851, the population of Tottenham was then only 9120; to-day it was 130,444. In those days of long ago, he used to inspect the meters and collect the rental; and there were also many houses supplied with gas, without meters, but simply through a cockspur—charge being made at so much per hour. Of course, a great amount of reliance was placed upon the honesty of the consumers who paid by the hour. The price of gas was then 7s. per 1000 cubic feet; it was now 2s. 6d. It must be remembered that the successes of the Company—everyone of them—had been brought about by the economies of former years; and the present Chairman and Board were following the same policy of keeping the capital down.

Mr. D. FORD GODDARD then proposed that the remuneration of the Secretary (Mr. E. Topley) be £450. He believed, from the experience they had already gained of Mr. Topley, that he would make a very efficient Secretary.

Mr. W. B. RANDALL seconded the proposition; and it was unanimously passed.

Mr. TOPLEY having responded,

A hearty vote of thanks was passed to the Chairman and Directors, on the proposal of Mr. BAKER, seconded by Dr. BENJAFIELD.

The CHAIRMAN having responded, proposed a vote of thanks to the Engineer and Secretary, and their respective staffs.

Acknowledgment was made by Mr. BROADBERRY and Mr. TOPLEY.

CREATION OF FURTHER CAPITAL.

On the proposition of the CHAIRMAN, seconded by Mr. BAILEY, the Directors were authorized to create and issue as required, additional "A" and "B" consolidated stocks or new preference stock to the amount of £200,000, and also to borrow, by the creation and issue of 4 per cent. debenture stock, sums not exceeding in the whole £60,000. In the course of a few remarks, it was pointed out by Mr. H. D. ELLIS that, whereas the capital was equal to 9s. 8¾d. per 1000 cubic feet six months ago, it was now down to the low figure of 9s. 4¾d.

The meeting then ended.

BROMLEY GAS CONSUMERS' COMPANY.

Fluctuations of Increased Consumption—New Plant—Position of the Gas Coal Market.

The Half-Yearly Meeting of this Company was held last Tuesday, at the Bell Hotel, Bromley, Kent—Mr. ALEXANDER DICKSON in the chair.

The SECRETARY (Mr. H. W. Amos) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the Directors met the shareholders on this occasion with further reassuring features of the Company's progress. The increase in the make of gas for the half year was 4½ million cubic feet; and this, added to the increase of 7½ millions the previous half year, gave an increase of 12 millions for the year. That was a very satisfactory figure. The fluctuations in consumption might truly be said to be as fitful as the weather. Those of the half year were very interesting and instructive; and he would just refer to them briefly. For instance, in the first three months of that period, they had no less than 3 million cubic feet increase in the make of gas. Up to Michaelmas, the duration of sunshine, as the shareholders would remember, was more prolonged than usual. The temperature generally was that of an unusually warm summer. Gas was not then apparently required to any great extent for lighting or heating. The inference appeared to be that the facilities for cooking by gas in hot weather were now becoming more generally known and appreciated, and that, as cooking-stoves were popularized in the future, he thought they might confidently look forward to an increased summer business. Then in October and November, the consumption fell off somewhat through the absence of any marked periods of cold or fog, in which the use of gas for both lighting and heating would have been greater. But so soon as real winter came upon them with Christmas, the daily increases at once became very substantial, proving that for lighting, heating, and cooking the Company's field of supply would be as expansive as heretofore when favourable conditions prevailed. He thought this was a very reasonable conclusion from that retrospect of the

variations of the consumption during the half year; and this experience, he was pleased to say, had also characterized the supply in the past six weeks. The Company had given the greater use of gas every possible encouragement—first, by continuing the reduction in price made in Michaelmas, 1905, although the cost of manufacture had increased and the revenue from residuals had slightly diminished. At such a time, all possible economies in manufacture needed to be applied, and that they were endeavouring to realize them would be evidenced to the shareholders by the improvements that had been effected at the works. Formerly the coal was taken from the railway trucks, wheeled to the retort-house, the retorts were charged, the coke was raked out into barrows, wheeled to the yard and quenched, and then shot, stacked, and loaded—all by hand labour. Now the coal when it left the railway trucks was elevated, conveyed, and delivered into the retort-house by machinery, the retorts were also charged mechanically, and the hot coke pushed out by machinery; and then the coke was dealt with by their latest new plant. It fell on to a conveyor, provided with self-acting water-jets for cooling it as it passed along; the conveyor carrying it to bunkers in the yard, whence, as required, it was lifted by a rotary overhead steam-crane, either for treatment by mechanical breaker, for stacking or loading into carts, or for depositing directly into railway waggons on the Company's own siding for distant deliveries. The crane, which worked on a circular gantry, spread its reach practically over the whole space of the yard where the coke was handled, stacked, or loaded. The addition of this new plant would, under an original scheme, have constituted a capital outlay; but in the circumstances of to-day, the Board and their Engineer had thought it in the best interests of the Company to defray half the cost out of revenue. They had, therefore, charged half against the balance of undivided profit; and the other half had naturally gone to capital. But instead of the Company being able to reap the advantages of these improved arrangements for their consumers and the shareholders under their co-partnership for the division of profits above the standard dividends, they unfortunately found themselves once more confronted with higher prices in the coal market, which threatened to divert the whole of this benefit to the coal owners and the miners. Those of the shareholders who had read a letter in the Press the other day from an anonymous writer, purporting to know the mind of the coal owners, were doubtless astonished at the intention announced—now that the demand for coal in the iron trade and the foreign supply, conduced to higher prices—to permanently raise the price of gas coal to an equality with other coal, and to abstract in that way, for the benefit of the coal owners, a large part of what the anonymous writer described as the inflated profits of the industry. The writer obviously knew but one side of his subject; and might yet find his prey was hardly worth the effort of capture in the mode contemplated. However badly the colliery owners might have done on their avowed average of 5 per cent. for so many years, the writer appeared to be oblivious of the fact that, since the days of the auction clauses, now some thirty years ago, the capital of gas companies had earned for investors no more than the poor yield the writer said the colliery owners had had on theirs, and he appeared also ignorant of the division with the consumers of the profits above the standard rates—a large portion thereof being taken in the reductions of the price of gas under the sliding-scale. He (the Chairman) could only say with regard to this gentleman and his prognostications, that it not infrequently happened that spoliators miscalculated their factors. In any case, consumers of either municipal or company gas must deplore the withdrawal last year of the export duty on coal as a great misfortune for them as well as for the makers and sellers of gas. He had, at a previous meeting, referred to the disastrous results imposed on the home consumer by reason of the price exacted from the home gas industry upon the terms made with foreign buyers of our gas coal, who seemed to fall such easy victims to enhanced prices year after year, and obligingly created precedents that were afterwards made to govern home sales. This year as last, prices were being set not on competitive negotiations with the home industry, but on terms obtained under a foreign contract, rendered more possible by the abrogation of the shilling per ton export duty. To allow foreign buyers to come and take the coals of this country at their own prices without an export duty, and so to raise its price against users in this country, was scarcely creditable trading. While the Board of the Bromley Company had remained silent on the question of the price of gas until purchases were made, intimation had already been given by some of the other companies that they might have to raise it. If it should be so, he hoped that every thoughtful gas consumer would consider well what his part should be in relation to a question which was of such vital importance in the supply of cheap gas. In subsequent remarks, the Chairman referred to the extension of the incandescent gas-burner; mentioning that the Borough Council had recently ordered the remaining public lamps to be so fitted. The Company had also arranged for a special inspection of consumers' fittings by experienced men, and their adjustment whenever they required it. Following on, reference was made by the Chairman to the grief of the Directors at the sudden death of their esteemed colleague, Mr. A. E. Willett; and high tribute was paid to Mr. Willett's personal qualities as a man and as a Director. To fill the vacancy, he also announced that the Directors had selected Mr. Edward Latter, the senior partner in the old legal firm with which Mr. Willett was associated. Mr. Latter was the eldest son of the late Mr. Robinson Latter, his (Mr. Dickson's) predecessor in the chair, who strove long and faithfully for the interests of the Company. Regarding the accounts, the Chairman said the increase in the half year from gas and meter rental, with the rental from fittings and stoves, was £808. The returns from residuals had not been so satisfactory by £395. While the price of coke had improved, there had been so substantial an increase in the quantity consumed on the works through various causes (principally connected with the reversion of working to the old retort-house during the installation of the new coke-handling plant in the modern one), that the quantity sold had been rather less. Coal cost £1350 more; but adjusting the variations in the other items of the expenditure, the net additional expenditure worked out to £1242. The balance this year was not, therefore, so large by £828. But, having accumulated the surpluses of past years, they had been able to continue so far the price of gas at the reduced rate of 2s. 11d. per 1000 cubic feet; and, after applying £2045 of the accumulations in payment of the half cost of the new coke-conveying plant, they would have in hand, after paying dividends as heretofore, the sum of £2187 to carry forward to the next account.

The Deputy Chairman (Mr. B. H. Latter) seconded the motion, which, after an explanation of one or two items in the accounts, was unanimously adopted.

Proposed by the Chairman, and seconded by Mr. S. J. Wilde, a dividend was declared at the rate of 6 per cent. per annum on the "A" ordinary stock and 4½ per cent. on the "B" ordinary stock, both less income-tax.

The retiring Directors (Mr. S. J. Wilde and Mr. Hugh Wyatt) and Auditor (Mr. A. S. Hicks) were all re-elected.

Moved by Mr. F. W. Church, and seconded by Mr. T. Wilkins, a hearty vote of thanks was passed to the Chairman and Directors.

The Chairman, having acknowledged the vote, made well-merited recognition of the services of the Engineer (Mr. W. Woodward) and of the Secretary (Mr. H. W. Amos).

Mr. Woodward and Mr. Amos responded; and the proceedings then concluded.

BOURNEMOUTH GAS AND WATER COMPANY.

The New Gas-Works—Continuous Carbonization in Vertical Retorts.

The Ordinary General Meeting of this Company was held on Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. G. Crispe Whiteley in the chair.

The Secretary (Mr. William Cash, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said it was with much pleasure he brought them before the proprietors. The half year had not been a very grand one for gas companies—mainly because of the fine weather that existed during the best part of the six months, and the extremely mild weather during the winter part. He need not say that Balmy Bournemouth and Sunny Boscombe had had their full share of bright weather; and although they could congratulate the inhabitants upon having this weather, from the Company's point of view they could have preferred that it had been a little more inclement. Since then there had been cold and sharp weather; and so, from the Company's standpoint, they had had a better time, and had done a better business. But in spite of the unfavourable influences of the half year, their revenue receipts showed a satisfactory increase under every head. He might add that the fact that they had not during the past six months proceeded by the leaps and bounds to which they had been for so many years accustomed, was partly due to building operations in Bournemouth not having been quite so extensive as they had usually been. There seemed to be some slight slackening off, possibly because building had been progressing too fast in past years; and he thought that perhaps it was better and wiser to have progress a little more regular. However, they need not be alarmed as to the future. Anyone driving round about Bournemouth, especially in the neighbourhood of the new Queen's and King's Parks, would see that enormous estates were being laid out for building purposes, which would, in due course, he had no doubt, be covered with houses as other estates in Bournemouth had always been. The Company's customers appeared to be satisfied. They appreciated the accommodation the Company provided for them at their shops both at Boscombe and in the Christchurch Road; and the sale of fittings had been very good at both places. It was an encouraging fact that they were selling more of their gas fires and cookers now, rather than letting them out on hire, which was better both for their customers and themselves. As for the new gas-works at Poole, the Board had recently visited them; and they were now in working order. He could most sincerely and heartily congratulate the proprietors upon these works, which, in his opinion, redounded very highly to the credit of their General Manager and Engineer (Mr. Harold W. Woodall), from whose designs, and under whose supervision, they had been constructed. The works appeared to him (the Chairman) to be a perfect marvel of method and arrangement—nearly every modern idea and view had been incorporated in them. The great point about them would be the economy in the production of gas. The present accounts showed at once the amount of economy they were likely to gain by bringing these new works into operation, because although during the six months they had carbonized more coal, and had had coal at a higher price per ton than in the corresponding half year of 1905, they had produced gas at less cost per ton, owing to the saving on the carriage of coal, and getting it to the Poole works. There at once was a striking effect of the new works. As he said, the proprietors might congratulate themselves upon the possession of these works—not only for the present but for the future, because while they were able to turn out from them at the present time 2½ million cubic feet per day, they had there coal-handling plant and other buildings sufficient for a production of double this amount. This would show the way in which their Engineer had been dealing not only with the present, but had thought for the future. The zeal and enthusiasm Mr. Woodall put into the work was certainly considerable and undeniable. It might interest the proprietors also to know that at the Bourne Valley works, they had erected some vertical retorts—in fact, they had given their Engineer a free hand with regard to this matter—and these had now been in operation for some weeks. He (the Chairman) thought he might say on behalf of the Board that, from what they had seen, this system had passed from the experimental stage, and that the problem of continuous carbonization was now practically solved. If these vertical retorts created a revolution in the gas world, as some people expected, and other people hoped they would do, the Company would be able to claim that they were one of the pioneer companies, if not the pioneer company, in assisting to create that revolution; and the Company would also have the full advantage of the benefits that might arise from such a change. He need not detain the proprietors for long over the accounts. They had perhaps noticed that the Directors were not

placing the usual £1000 to reserve this half year, because they found the reserve fund now came to more than £50,000; and it was thought that, for the present at least, they might leave it at the amount named. Half the reserve was invested; and half was being used in the Company's business. And as they were writing off from capital—very properly and rightly—large sums for buildings which the new Poole works replaced, the Board thought that for a time they could leave the reserve fund alone. Then with regard to the revenue account, there were no points to which he need particularly draw attention. They had had to spend, as he warned the proprietors they would have to do, a little more money before Parliamentary Committees; and this now appeared in the item of £260. Due to this expenditure, they had been able to retain a very important district for the supply of water for the future, which he did not think they would have been able to do if they had not put on a strong face before the Parliamentary Committees.

Mr. CORBET WOODALL seconded the motion; remarking that there was not much in the accounts that called for notice which had not been fully dealt with by the Chairman. He had no doubt those proprietors who had looked into the accounts with care would have observed the large amount that had been spent on repairs and renewals. But when changes were taking place such as those that had been occupying so much of their attention—involving practically the removal of their manufacture from Bourne Valley to Poole—it was inevitable that there were demolitions and alterations made, both at the old and the new works, which could not be fairly charged to capital, and must come upon revenue. The extra costs amounted to nearly £4000; and had it not been for this, there would have been a satisfactory increase in the balance, instead of a small one, to go to profit and loss. However, for his own part, he always thought money was better spent in such ways than merely accumulated and invested outside the undertaking. He shared the feelings expressed by the Chairman as to the new works, the saving effected by which he had referred to. If, however, he might venture to qualify the Chairman's remarks in one small particular, he would say that the saving was due not simply to the greater facilities for obtaining coal at Poole as compared with Bournemouth, but also to reductions in cost of labour, &c., at the new works.

Mr. BOSHER said if the Directors thought it prudent to answer, he should like to know how the Company stood in regard to coal for the next twelve months. In Yorkshire they held the view—of course, it might be incorrect—that they were in for an exceedingly bad time respecting high coal prices. He was wondering whether the Company had been fortunate, as several companies had been, in contracting for coal for a considerable period ahead.

The CHAIRMAN said he had carefully kept off the coal question. But he did not disguise the fact, and the Board were quite alive to it, that there were troubles possibly before them; and they would try to meet them as well as they possibly could. The Company had not got contracts ahead; and they would have to face the storm, as they had faced it before. They would anyway get through it in the best possible way.

The motion was carried unanimously.

Moved by the CHAIRMAN, and seconded by Mr. S. L. RYMER, dividends were declared at the rate per annum of 14 per cent. on the ordinary shares, 7 per cent. on the "B" ordinary shares, and 6 per cent. on the preference shares, after paying which the sum to be carried forward will be £4296.

Proposed by the CHAIRMAN, and seconded by Mr. RYMER, Mr. Corbet Woodall was returned to his seat at the Board; and a subsequent resolution, moved by Mr. PILLEY, and seconded by Mr. GLEN, reappointed Mr. J. C. Benwell, F.C.A., as one of the Auditors of the Company.

The CHAIRMAN then proposed the increase of the Secretary's remuneration by £200 per annum. He remarked upon the great growth of work that their progressive business had cast upon Mr. Cash and his staff, and pointed out that the remuneration paid to Mr. Cash included the use of office and staff.

Mr. A. W. OKE seconded the motion, which was very cordially agreed to.

Mr. CASH expressed his gratitude, and then gave some particulars as to the remarkable growth of the Company. The gas sold had doubled during the past seven years; having risen in that period from 313 million cubic feet to 664 millions. The number of consumers had also enormously advanced, due in part, of course, to the introduction of the prepayment system. The proportion of gas consumers to water consumers was still most excellent. In fact, they were in the extraordinary position that—whereas water was a necessity of life, and the Company were supplying practically every one of the houses in the district, and gas was an optional thing, and was in competition with electricity—their total number of water consumers at the end of last year was 14,500 and their gas consumers 18,000. This was partly accounted for by the fact that they were not supplying Southbourne and Poole with water. But the policy of the Board had been in this direction, and therefore the two things had maintained the balance which they had occupied for a long time.

Moved by Mr. BOSHER, and seconded by Mr. BARRETT, a hearty vote of thanks was passed to the Chairman and Directors and to the officers and their staffs.

The CHAIRMAN, the ENGINEER, and the SECRETARY responded. Mr. H. W. Woodall, referring to the interesting figures given by Mr. Cash, said the output having doubled during the last seven years, the 4 per cent. increase in the past half year was one with which, he thought, the proprietors might be content. The concern was getting a big one now; and it therefore became more and more difficult to maintain the percentage rate of increase on the enlarged output.

The proceedings then terminated.

The Portrush Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for a steel tank, 45 ft. 6 in. diameter and 18 ft. 6 in. deep, and a single-lift spiral-guided gasholder, 42 feet in diameter and 18 feet deep, complete with foundations. The work is to be completed by the middle of May, to the satisfaction of Mr. W. C. Pinkney, the Company's Engineer and Manager.

BARNET DISTRICT GAS AND WATER COMPANY.

A Satisfactory Report.

The Half-Yearly Meeting of this Company was held on Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. ALFRED H. BAYNES in the chair.

The SECRETARY (Mr. E. W. Drew, F.C.A.) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he thought his first words that day on behalf of his colleagues and himself must be to express deep regret at the sudden and lamented death of Mr. I. A. Crookenden, who had for several years been a Director of the Company. They all felt that he rendered signal service to the undertaking; and he had no doubt whatever that the shareholders would join with the Board in giving expression to their respectful and most sincere sympathy with the bereaved family and relatives in this time of sore loss and trouble. The shareholders would probably have noticed from the report that the vacancy on the Board created by the death of Mr. Crookenden had been filled by the unanimous election of Mr. Frederick Lennard, who had for more than thirty years been Auditor of the Company. The Directors felt that they could look to Mr. Lennard for most valuable service; and they congratulated themselves on having him as a colleague. Referring to the report, and dealing first with the gas undertaking, it was satisfactory to know that during the six months to Dec. 31 there was an increase in the gas made of 4,373,000 cubic feet, as compared with the corresponding period of 1905; and 401 tons more coal were carbonized. The gas sold was 3,134,000 cubic feet more; while the average make of gas per ton of coal during the past half year was 10,873 cubic feet. The cash received for residuals was £299 more—largely due, of course, to the increased price of coke. Of tar, there were 6342 gallons more made; the make per ton of coal being 11½ gallons. Then 59 tons of sulphate were manufactured, giving nearly 20 cwt. per 100 tons of coal. The total cash receipts for gas during the past six months were £11,255; being an increase of £531. The net profit on the sale of gas and residuals was £4307, or £227 more. On the expenditure side there had been an increase of £1133, which was accounted for in the following way: Rates and taxes—which seemed to go up constantly—were £186 more; additional coal, £333; and £600 was accounted for by the insertion in full of the receipts from stoves and fittings on the credit side of the revenue, and the amount for repairs and depreciation entered on the debit side for the first time. There had been an increase in the number of slot-meters; the total in use at present being 1131. With regard to the Water Department, the receipts for the half year were £16,444, or an increase of £1084 on the corresponding period. The expenditure, however, showed an increase of £1978, which was mainly accounted for as follows: By an increase in rates and taxes amounting to £467; extra fuel used in pumping, £422; and increase in wages, £264. The total net profit on gas, residuals, fittings, and water-rates for the half year, after allowing for interest on loans and income-tax, and a sum of £9434 required to meet the payment of the dividends as recommended in the report, left a balance of £1807 to be added to the balance to be carried forward to the next account. During the past half year, 1754 yards of gas-mains and 8496 yards of water-mains had been laid. The quantity of water supplied was 283,349,000 gallons—an increase of 39,261,000 gallons. Perhaps they would remember that at the last half-yearly meeting he told them the Directors were engaged in making arrangements for securing an ample provision of water so as to meet the increasing demands of their large and rapidly growing district. He then said that they had resolved to sink a new well at Northaw; and this work was now in progress. He was also glad to tell the shareholders that day that they had sunk a well at East Barnet for a depth of 240 feet; and this was giving a yield of a million gallons per 24 hours. They were also constructing at Arkley a reservoir capable of holding 2 million gallons of water, in pursuance of the powers contained in their last Act; and he thought, in looking at the position that day, they might well congratulate themselves on the condition of the Company.

Dr. J. W. L. GLAISHER seconded the motion.

Mr. DYER asked if anything was being done in the way of getting a reduction in the rates and taxes. At the South Metropolitan meeting a few days ago, Sir George Livesey said that 7 per cent. of the money paid for gas was absorbed in the rates and taxes. This was a very large item; and he (Mr. Dyer) thought it was one that ought to be seen into. Gas and water companies should do their utmost to get it reduced. He found that in several places the charges for rates and taxes amounted to something like 1½d. per 1000 cubic feet; while in others the figure was 3½d. Such a state of things as this, one could not understand. Surely there were some means of getting a uniform charge. The pumping expenses were rather high, but he presumed this was in connection with the new well. On the whole, it was an excellent report; and he heartily congratulated the Board on the position of the Company.

The motion was then carried; and on the proposition of the CHAIRMAN, seconded by Mr. ALFRED LASS, F.C.A., dividends were declared, less income-tax, for the half year, at the rates of 7½ per cent. per annum on the "A" and "C" stocks, 6½ per cent. on the "B" stock, and 5¼ per cent. on the "D" capital gas and water stocks.

On the motion of Mr. A. F. PHILLIPS, seconded by Mr. LASS, the retiring Directors (Mr. Baynes and Dr. Glaisher) were re-elected; and on the proposition of Mr. J. E. PLUMMER, seconded by Mr. DYER, the retiring Auditor (Mr. C. P. Crookenden) was also re-appointed. Proposed by Mr. PLUMMER, and seconded by Mr. SAMUEL CUTLER, Mr. B. D. Holroyd was appointed Auditor in place of Mr. Lennard, who has vacated the position on his election to the Board.

On the motion of Mr. CUTLER, seconded by Mr. JAMES RANDALL, the Chairman and Directors were heartily thanked for their services; and the proceedings concluded with a vote of thanks to the Manager, Secretary, and staff, which was acknowledged by Mr. T. H. MARTIN (the Engineer), Mr. E. W. DREW (the Secretary), and Mr. T. WRIGHT (the Cashier).

ASCOT DISTRICT GAS AND ELECTRICITY COMPANY.

Income-Tax Allowance in Respect of Depreciation—Prospects of the Electricity Project.

The Ordinary General Meeting of this Company was held last Thursday, at the Company's Offices, No. 50, Cannon Street, E.C.—Mr. JOSEPH MANWARING in the chair.

The SECRETARY (Mr. W. A. Schultz) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving their adoption, said that, at the corresponding meeting last year, it was his duty to refer to a slight decrease—amounting to about a ¼ million cubic feet—in the output of gas for the half year. He was glad to say, however, as the Board anticipated, this was only a temporary decrease; and while they were able to record an increase for the next half year, he was pleased to report that they were now able to point to an increase of nearly a million cubic feet, or to be exact 893,000 cubic feet (4½ per cent.), over the corresponding period of 1905. Through this, notwithstanding the reduction of 3d. per 1000 cubic feet in the price of gas for lighting purposes, the receipts had increased by £99. Though this sum was small, is was very satisfactory, in view of the reduction in price. The residual products had also yielded a better result, which was partly assisted by the completion of the installation of a sulphate plant, just before the close of the year. The total revenue showed an increase of £228, while the expenditure had increased by only £17; leaving the net profit £2241, as against £2030 for the corresponding half year. After deducting the interest on the debenture stock and temporary loans, there remained £2000 actually earned; while the balance at the credit of the profit and loss account was £2559. The Directors recommended the payment of a dividend at the rate of 5½ per cent. per annum, and they had specified the sum of £178 10s. for setting aside towards the depreciation fund for the renewal of plant. This sum was not an arbitrary figure, but represented one-half the annual amount now allowed by the Special Commissioners for income-tax in respect of wear and tear of plant and machinery. It would be remembered that the Secretary was instructed to lodge an appeal with the Inland Revenue authorities for obtaining this reduction; and he had been successful in establishing the rule that, in future, an allowance of 3 per cent. would be made on the present value of the plant and machinery in respect of such depreciation. The amount expended on capital account had been £1950. The capital account was in debit by the amount of £946; and this, with the expenditure on gas-stoves and the necessary working capital, had caused an overdraft at the Bank of £1209. The Directors, therefore, proposed to shortly issue the remaining debenture stock under the Act of 1882. One satisfactory feature in the working results was that the unaccounted-for gas had amounted to only 5·37 per cent., while the quantity of gas sold had been 10,260 cubic feet per ton of coal carbonized. Considering the Company's large area, extending over nearly 50 miles of mains, this reflected great credit upon the care exercised by the Engineer (Mr. A. E. Brooks). The number of consumers at the end of 1905 was 1107; whereas they now numbered 1197. The Directors, as promised at the last meeting, had given the matter of the erection of electrical plant their very careful consideration during the half year; and they had sought the advice of Mr. A. H. Dykes, of the firm of Messrs. Handcock and Dykes, of Westminster. Upon the instruction of the Directors, the Engineer and the Secretary had visited several electrical works where the conditions of the neighbourhood were similar to those at Ascot; and the Directors had had before them approximate estimates from Mr. Dykes as to the cost of laying down the necessary plant, and the probability of the demand in the neighbourhood of Sunningdale and Sunninghill. The Camberley Electric Lighting Company gave notice of their intention to apply to the Board of Trade for power to supply electricity in the heart of the district authorized to the Ascot Gas Company. The Directors thereupon instructed their Parliamentary Agents, Messrs. Lees and Butterworth, to oppose the application; and he (the Chairman) was pleased to say that, for the present session, the application had been dropped. If, therefore, the Ascot Company proceeded to exercise their powers under the Act they obtained last session, it was possible the application would not be repeated. When the Directors were in possession of the tenders for the various portions of the plant, it would, of course, be necessary to take steps to raise the capital to provide for this part of the Company's operations. The shareholders might, however, be quite assured that the intention of the Directors was to exercise the strictest economy in relation to this matter, as they were satisfied that, with the judicious expenditure of capital, this part of the Company's revenue would in a very short time prove remunerative. He thought the shareholders would agree with him that the accounts disclosed a very satisfactory state of affairs, and that the prospects for the future were very hopeful.

Mr. H. W. SMITH, in seconding the motion, said the balance-sheet was very satisfactory; and the working was good. Although but little more coal had been used, more gas had been made by 893,000 cubic feet. He advised caution in entering into the electricity undertaking. He preferred his fairly certain dividend of 5½ per cent. from gas.

Mr. SAMUEL SPENCER also congratulated the Directors upon the accounts. He noticed, however, rates and taxes showed an increase of about 80 per cent., and asked whether this arose from increased assessments.

From replies to questions, it was gathered that the present coal contract runs to the end of June, and that the cost of coal delivered on to the works is now about £1 per ton. As to the increase in the rates, it was explained that the assessment was formerly low; and on the re-assessment, the Company's valuation was about trebled. On appeal, however, it was reduced to about double the former figure. It was proposed to generate electricity by suction gas; but nothing beyond the preliminary work for a scheme would be undertaken without consulting the proprietors.

Mr. DYKES, invited by the Chairman, spoke of the advantages of the administration and control of gas and electricity undertakings being under one Board and officers; of the savings to be effected in this manner; and of the safety to capital that the absence of competition gave to those who invested their money. The fact that there were many houses in the district already wired showed that a demand for electricity existed. By using suction-gas plant for generation, a market was created for the gas-works coke; and they would have their own gas as a stand-by. He considered that the Company were in a strong position in this matter.

The motion was unanimously carried.

A resolution was passed declaring a dividend at the rate of 5½ per cent. per annum, setting aside £178 10s. for renewals, and carrying forward the balance of £730. Succeeding this, Messrs. F. Bridges and Henry Woodall were re-elected to their seats at the Board; and the Auditors (Mr. T. A. Welton and Dr. Strong) were re-appointed.

Mr. H. WOODALL, in acknowledging his re-election, said he was sure it would be to the advantage of both consumers of gas and electricity that both sources should be in the hands of one Company than in the hands of two, which would call for the expenditure of far more capital. If electric lighting were well established, it must redound to the profit of the shareholders in the existing Company; and it gave a certain amount of security to gas shareholders that they would not otherwise have. They had until next August twelve months in which to move; and he did not therefore think the Directors would have resorted to anything in the way of capital expenditure until they met the shareholders again.

The usual votes of thanks were passed to the Chairman and Directors, and to the officers; and the proceedings then terminated.

PROVINCIAL GAS COMPANIES.

Increased Profit at Barnstaple.

Presiding at the annual meeting of the Barnstaple Gas Company, Mr. C. E. R. Chanter said the revenue for the year 1906 was £9467, which was an increase of £619 over that for 1905. This was almost entirely attributable to private lighting, which in 1905 brought in £6342 and in 1906 £6711, or £369 more. Another satisfactory increase was one of £229 in the revenue from coke. The expenditure for the year was £7115, compared with £6807 in 1905; and the balance carried to the profit and loss account was £2352, against £2040. This increase was especially gratifying, in view of the fact that the expenditure on repairs had been very large. Gas companies had to face a rise in the price of coal. Fortunately for the shareholders in the Company, the Directors had made their contracts forward to a large extent; and only a few days before the rise took place, at the suggestion of their Manager, they purchased an additional 1000 tons. At present they had coal bought forward at the price before the rise to the extent of nearly 3000 tons. Mr. Chanter went on to show that, in spite of the opposition of the municipal electricity undertaking, the business of the Company had increased largely. Since 1898 the revenue had grown from £7513 to £9467; while the number of consumers had increased from 981 to 1703, and of cooking-stoves on hire from 203 to 786. The price of gas had been reduced from 3s. 9d. to 3s. 6d. per 1000 cubic feet. He also referred to the public lighting. In 1902—the last year in which gas only was used—the cost of lighting the town was £759; whereas last year, when it was lighted by gas and electricity, the cost was £2091, of which only £302 was paid to the Gas Company. He wished the Corporation would put incandescent burners in the lamps still lighted by gas. If this were done, he was satisfied that a comparison of the light produced by incandescent burners with the ordinary incandescent electric light would be of very great benefit to the ratepayers at large, and also to the Company. The report was adopted and the usual dividend declared.

Ten Years' Progress at Bromsgrove.

At the recent annual meeting of the Bromsgrove Gas Company, the Chairman (Mr. John Green), in moving the adoption of the report, congratulated the shareholders on the result of the past year's working, which had produced a profit of £2122. He remarked that one of the most satisfactory and reassuring features in connection with the undertaking was the steady and continuous increase in the demand for gas. This could be best shown by a comparison; and though comparisons were said to be odious, he thought in this case it would be agreeable. In the year 1896, the quantity of gas made by the Company was 23 millions; whereas last year it exceeded 50 millions. Ten years ago they had not a prepayment meter or stove in use; at the present time they had 607 of the former and 447 of the latter. In addition to this, there had been a steady augmentation in the number of ordinary consumers; and they were still increasing. It was a very gratifying thing to the Directors to find that the use of the incandescent burner and mantle was gradually displacing the old and unsatisfactory flat-flame burner. They were quite aware that the improved burner tended to diminish the consumption of gas, and consequently to lessen the bills; but they were perfectly satisfied with this position, and were looking to increase their output by adding to the consumers, and also by the development of the uses to which gas was adaptable, such as heating and cooking. He need only add that the Company were still progressing, and they hoped to go on, he would not say rapidly, but steadily. The report was adopted, and a dividend was declared on the original shares of £5 10s. per cent. (making £8 10s. per cent. for the year), and on the "B" shares of £3 17s. per cent. (making £5 19s. per cent. for the year), free of income-tax. In the course of the subsequent proceedings, gratification was expressed at the reduction which had been made in the price of gas; and the thanks of the meeting were given to the Secretary (Mr. T. Roper) and the Manager (Mr. A. Bird), for the conscientious discharge of their duties.

Increased Consumption in Chester.

In the report presented by the Directors of the Chester Gas Company at the half-yearly meeting on Monday last week, they stated that the quantity of gas sold in the six months ending Dec. 31 last showed a substantial increase; and the demand for gas cookers, fires, and other apparatus had been very satisfactory. Considerable expenditure had been incurred on the works in the repair of plant and in rectifying

the Company's boundaries in accordance with agreements with the Corporation. There was a reduction in the revenue from residuals, owing to the markets being lower throughout the half year. After providing for interest on loan capital and dividend on preference stock, there remained a balance to the credit of the profit and loss account of £4144, out of which the Directors recommended payment of a dividend on the ordinary stock at the statutory rate of 2½ per cent. in respect of the half year. In moving the adoption of the report, Mr. J. G. Frost, who presided in the absence of the Chairman (Mr. John Gamon) through illness, said it was satisfactory to record that there was an increase of £529 in the sales of gas; but there was a drop in the receipts for residuals of £203, and the net increase on the revenue receipts was £324. The extra expenditure was £238. There was left for profit £5591, which was £86 more than in the December half of 1905, and was more than sufficient to meet the dividend and interest. The demand for gas showed a steady increase throughout the year; and the total quantity sold had been 223 million cubic feet, against 215 million cubic feet in 1905, which was a record year. The total funds in reserve and for carrying forward amounted to £13,539. The report was adopted and the dividend declared.

Good Results at Ipswich.

The report submitted at the recent annual meeting of the Ipswich Gas Company stated that the balance of profit and loss for the year ended Dec. 31 (after payment of the interim dividend) was £10,603. The Directors recommended the payment of further dividends at the full statutory rates on the various stocks. This would leave a balance of £4588 to be carried forward. In presenting the report and balance-sheet, the Chairman (Mr. D. Ford Goddard, M.P.) said the year that they had gone through had been a very prosperous one for the Company, in spite of the keen competition of electric light carried on by the Municipal Authority, with the bottomless purse of the ratepayers behind it. Notwithstanding this, more gas had been sold last year than had ever been sold before in Ipswich. The total number of consumers on their books had now reached 13,595, which was an increase of 891 during the year. They had on hire 5143 cooking-stoves, which had become a very important branch of the business. There were at the present time 165 gas-engines in the town using the Company's gas, without mentioning the enormous number of gas-fires, which almost every user of gas found a comfortable and cheap addition to the household requirements. The result of all this had been that they had sold during the past year 409,561,000 cubic feet of gas. He was pleased to say that they were now feeling the full benefit of the mechanical retort-house appliances which were adopted some years ago; while the unaccounted-for gas had reached a lower amount than had ever before been recorded in the history of the Company. They had looked the problem fairly in the face; and he did not think they would have to increase the price of gas in order to meet the greater cost of coal. As to the revenue account, private and public rentals showed an increase of £1629. Residuals were less, because the amount of coal used had been less; but they had used instead of 8698 tons of coal, 877 tons of oil to enrich the gas which they made. Purification had cost £300 less; but this did not mean that there was less purification. The fact was there had been less gas from the coal to purify. They had, as a matter of fact, received a large number of complaints about the smell of the gas; but as a general thing they had been able, on investigation, to trace the complaints to defective burners. The smell was in no sense due to want of purification. In consequence of the Special Act they had obtained, they were not now under any statutory obligation in regard to the sulphur compounds in their gas; but they had striven, and had succeeded in maintaining just the same quality as regarded purity as when there was a severe penalty attached. He said this publicly, because everybody thought that, in consequence of the Act, something was done to render the gas less wholesome, which was not a fact. He was glad to say that the wages bill had been reduced by £1000 in the retort-house. This was entirely due to the circumstance that there were less men employed. They had renewed the contract with the Corporation for the public lighting for another two years. It was with regret that the Directors had to inform the shareholders that, owing to what they considered the unfair action of the Overseers in raising the assessment of the undertaking to an unreasonable figure, they felt obliged, after having applied in vain to the Assessment Committee for relief, to appeal to the Recorder at Quarter Sessions. The Recorder's decision was in favour of the Company; but against this the Guardians had decided to appeal. It behoved him to be careful what he said, as he did not want to prejudice the result; but the Board looked forward to the result with every confidence. The net result of the accounts was that they carried £13,142 to the profit and loss account, as against £12,555 last year. He was very glad to be able to make such a report to the shareholders. The report was adopted and the dividends declared; and the proceedings closed with votes of thanks to the Chairman and the Engineer (Mr. J. T. Jolliffe) and staff.

A Small but Progressive Company.

Though the operations of the Leominster Gas and Coke Company are not of great magnitude, the Directors were able, at the annual meeting last Saturday, to recommend the payment of dividends at the usual maximum rates. The Company sold rather more than 22 million cubic feet of gas last year for ordinary consumption; being an increase of about 207,000 cubic feet. In the course of the past few years, a large amount has been spent in putting the works, as far as possible, into a complete condition. But now that there is no necessity for further outlay, beyond that entailed by ordinary repairs and renewals, there is a prospect, unless coal advances, of a reduction in the price of gas from the present figure of 3s. 4d. per 1000 cubic feet. The Manager (Mr. C. Eastment) has well-equipped works, and he may be relied upon to carry them on as economically as is practicable.

The Coal Question at Newmarket.

Mr. R. Stephenson, J.P., when presiding at the annual meeting of the Newmarket Gas Company on Monday of last week, said that though the receipts from the sale of gas had diminished by £254 during the year, the profits had increased by £188. Coal had cost less, and the expenses of maintenance had been reduced. The present coal contract would not expire till next autumn; and after that the cost of coal might be substantially greater. Next year they would, too, have to renew four benches of retorts at a cost of about £300. Though he had always been, and still was, a Free Trader, he was entirely in agreement with the remarks recently made by Sir George Livesey. Every industry in the country was absolutely dependent upon a regular and constant supply of coal; and it was a grave mistake to take off the export duty. The foreign demand was very fluctuating, and practically upset every trade, with the result that the damage done to British industries was greater than any benefit coal owners and miners derived from an increase in the price of coal. The report, which was adopted, stated that the net balance of profit earned during the year to Dec. 31 was £4296, and a balance of £1588 had been brought forward from the previous year. Debenture interest amounted to £162. It was recommended that a dividend of 6½ per cent. be declared, and that the balance, amounting to £2017, be carried forward.

PROPOSED FEDERATION OF POTTERIES TOWNS.

An inquiry has lately been held at Stoke-upon-Trent, by Major C. E. Norton, R.E., one of the Inspectors of the Local Government Board, into an application by the Town Councils of Stoke and Longton for a federation of these boroughs and the urban district of Fenton into a county borough. Mr. Honoratus Lloyd, K.C., and Mr. B. C. Brough appeared for the Joint Committee of the two Town Councils; and Mr. J. D. Fitzgerald, K.C., and Mr. Hutchinson represented the Fenton Urban District Council, who opposed the scheme, in company with the County Council and a number of manufacturers, tradesmen, and property-owners of Longton, for whom Mr. Vesey Knox appeared. The Staffordshire County Council were concerned in the project; and their interests were looked after by Mr. W. J. Disturnal. Arrangements had been made for evidence on behalf of the applicants to be given by Alderman Geen, who was to deal with financial matters; by Mr. Corbet Woodall, who was to take up questions of gas supply and management; and by Mr. G. R. Strachan, whose special experience on sewage treatment was considered to be valuable. For the opposition, Mr. W. Cash (of Messrs. Cash, Stone and Co.), Mr. Charles Hunt, Mr. J. W. Wilcox (one of the Consulting Engineers for the Birmingham sewage scheme), and Mr. Alexander Scrivener were to give evidence in their particular departments.

The inquiry was opened by Mr. Honoratus Lloyd, who explained the object of the application, gave a history of the federation movements in the Potteries towns, and generally outlined the scheme for which the applicants were seeking authority. He argued that the three towns together really comprised one district; that there was a great community of interest between all the areas; and that unification would tend to economy and greater efficiency in municipal administration. He contended that work was now being done by each town individually, in matters like sewage disposal, gas and electricity production, &c., which it would serve the common interest better to have in the hands of one authority. He concluded by stating that the proposal was that for a period of (say) five years (though they did not tie themselves to this period, because if it was too long or too short the matter was one for discussion), there should be five rating areas, three in Longton, as now, and two others, Fenton and Stoke; and that each of these should bear its own particular expenses, and should contribute only to a common fund for the purpose of common expenditure. He said he did not propose to go into the details; but Alderman Geen would lay the matter before the Inspector, and any criticisms he would be only too willing to discuss, as the one object the memorialists had in view was to try, if possible, to be fair, not only to themselves, but to others.

The first witness called was the Town Clerk of Stoke (Mr. J. Blow Ashwell), who was followed by his colleague at Longton (Mr. G. C. Kent), who was under examination when the inquiry was adjourned for the day. The next morning was occupied with evidence by the Borough Surveyor of Longton (Mr. J. W. Wardle) and the Medical Officers for the two memorializing towns (Drs. Dawes and Petgrave Johnson). Alderman Geen, who was subjected to a long examination on the financial aspect of the question, put in a statement he had prepared which furnished the following particulars in regard to the three towns proposed to be federated:—

	Stoke.	Fenton.	Longton.
Estimated population, March 31, 1906	33,500	24,300	36,900
Area in acres	1881	1752	1947
Rateable value	£119,965	£91,601	£122,741
Loan liabilities	£191,943	£103,387	£315,210
Current rates	8s. 5d.	7s. 4d.	8s. 7d. (aver.)

In the afternoon of the second day of the inquiry, Mr. Corbet Woodall was examined by Mr. Honoratus Lloyd. He said he had for some years been intimately acquainted with the district, all the three gas-works in which were well managed; but he thought amalgamation would result in more economical production of gas. In this particular case, the controlling staff was multiplied by three; and he did not think that, after the amalgamation, the staff would be any larger than the present for one section of the works. Then the capital invested in he three undertakings was also greater than would be needed in one doing the work of the three. In regard to the distribution, each could help the other, because the extremities of one would come into the neighbourhood of the main supply of another; and generally the expenditure, both on capital and on working, would be smaller. Asked how, supposing the proposed union were carried out, and the three undertakings came under one ownership, he would advise, from an economical point of view, that the manufacture and distribution of gas should be carried on in the future, the witness said the three works were in good condition, and it would be an expensive thing to discontinue them, though this would be the ultimate effect of it. Two works were capable of providing gas for the whole district. Stoke and Longton could do it; and so, with a little extension, could Longton and Fenton. But what would take place at once would be that in the summer time one of the works could do the whole supply, and the other

two could be shut down, and all costs attending them suspended. It the three works had to be operated in the winter, as would be the case after a year or two, two would be worked to give a regular output, and the fluctuations of supply would be taken up by the third. As an illustration, witness said the British Gaslight Company, who supplied Hanley and Tunstall, had works at Etruria and near Tunstall. Last year, a communication main was laid down between the two works, with the result that for about ten months the Tunstall works would be thrown out of action. The result was that upon the gas made at Tunstall there was a saving of 2s. per ton of coal used. Reverting to the subject of the inquiry, witness said the actual quantity of gas sent out on the day of maximum output in 1906 was: In Stoke, 668,000 cubic feet; in Longton, 822,000 cubic feet; and in Fenton, 458,000 cubic feet. Dealing with the productive capacity of the three works, witness stated that those at Stoke were capable of making 900,000 cubic feet; the Longton works, 1,500,000 feet if they used to its full extent the water-gas plant); and the Fenton works, 730,000 feet. So there was a margin from the maximum demand in the case of Stoke of 25 per cent., Longton of 75 per cent., and in that of Fenton of 55 per cent. On the question of gasholders, Fenton had a margin of 90 per cent. If amalgamation were to take place, he would expect the federated borough to be able to make its contracts with regard to coal and materials, and also to get rid of its residuals, on more favourable terms than the present. The joining up of the mains of the three systems would tend to simplify the distribution of gas. He understood that the prices of gas now in the three towns, allowing for discounts, were: 2s. 10d. in Stoke, 2s. 11d. and a fraction in Longton, and 2s. 9d. in Fenton. The price charged for public lighting in Stoke was 2s. 7d. per 1000 cubic feet; in Fenton he believed no charge was made; and in Longton it was, he thought, 2s. 8d. Stoke and Longton had electric light undertakings, and the linking up of these would also, he considered, be advantageous and economical. This was a very strong point at the present moment.

In cross-examination by Mr. Fitzgerald, witness's attention was called to the fact that no charge was made for gas used for public lighting at Fenton, and that the charge there was lower than in the other towns. It was pointed out that in April last year the price was reduced to 2s. 9d., and from the 31st of next month it was to be brought down to 2s. 6d. Witness agreed that this figure was a fair one; but he added that there would be no difficulty in Stoke reducing its price. Asked if it would not be foolish, where there was careful management and a low price, to change the existing conditions in the hope of getting a reduction, witness said there was no reason why they should not do better. He thought all three towns would be benefited by amalgamation. Counsel reminded the witness that last year he advocated the setting up of independent works by the small district of Wolstanton, instead of taking their supply of gas from Burslem and Newcastle at a low price; and he said his reason for so doing was that Wolstanton would be able to supply gas at as low a price as they were paying. "Why then," asked Mr. Fitzgerald, "could not the small district of Fenton do as well?" Witness replied that he was not making the slightest reflection upon Fenton; he had already acknowledged that it was doing very well. But he said that an amalgamated concern would do better than separate works.

After a number of other witnesses had been called, the case for Fenton was opened on the third day. It was argued by Mr. Fitzgerald that Fenton was an old-established and well-governed urban community; that its debt was lower in proportion than that of the other towns; that its rates were also much lighter; that it was well equipped with municipal undertakings; that when a ratepayers' poll was taken, the electors, by an overwhelming majority, rejected the federation proposal; and that from no point of view was there any need to destroy the existing form of local government.

Called in support of the opponents' case, Mr. William Cash gave minute details as to the finances of the town, and informed the Inspector that for the last four or five years more money had been raised than was required for current expenditure, with a view to eventually applying the accumulated surplus to the reduction of the sewage-disposal or destructor debts. Addressing himself to the figures given by Alderman Geen earlier in the day, the witness gave his own estimate of the expenditure required to bring the town up to the level of the neighbouring boroughs.

Mr. Charles Hunt's evidence, briefly stated, was to the effect that though concentration was a good thing in theory, local circumstances must be looked to; and having regard to the fact that the three existing gas-works were well and economically managed, he argued that no saving would be effected by amalgamation.

Other witnesses having been called in opposition to the scheme, Mr. Honoratus Lloyd summed up the case for the memorialists; and the inquiry, which had occupied four days, concluded with a vote of thanks to the Inspector.

PROPOSED SALE OF THE BATH ELECTRICITY WORKS.

At Bath, general satisfaction appears to reign at the prospect of the Corporation having an opportunity of divesting themselves of the electricity undertaking, which has been, since the Corporation purchased it, a kind of millstone round the necks of the ratepayers. A Sub-Committee of the Electric Lighting Committee of the Corporation (whose appointment was chronicled in the "JOURNAL" for Nov. 20, p. 551) have recently been engaged in considering the offer of the Somerset and District Electric Power Company to buy the works, on the basis of the return to the Corporation of the capital cost, together with a bonus of £20,000. The capital cost of the undertaking amounts to £162,697.

When the Sub-Committee started their inquiries into the matter, they took the prudent course of consulting with the Board of Trade, with the result that, in the course of correspondence, the Board intimated that they could not allow the Corporation to contract their successors out of the benefit rights conferred by section 2 of the Act of 1888. Beyond this, the Board hinted that, even in the event of a transfer being made, they would require to be furnished with good reasons before departing from their practice not to allow any sum to be received in excess of the amount actually expended. This created a little difficulty between the negotiators. But they put their heads together; and it was then proposed to make the suggested bonus contingent upon the Company being able to obtain, with the aid of the Corporation, statutory powers for over-riding the Act of 1888, so as to assure the undertaking to them in perpetuity.

Having come to this understanding, the heads of a provisional agreement were arranged. By this, the Company agree to pay the actual capital cost of the undertaking, together with a sum of £2000 expenses incurred by the Corporation in obtaining the Bath Electric Lighting Order, with a bonus, in cash, of £10,000. The assets are not to include the sinking fund of £28,316, nor the sum of about £1076 standing to the credit of the reserve fund. If the Board of Trade persist in their refusal to consent to the transfer, the Company and Corporation will then, in the next session of Parliament, appear as joint promoters of a Bill (at the expense of the Company) to confirm the agreement outlined above. By further clauses in the agreement, it is arranged that, on the undertaking becoming vested in the Company in perpetuity, the Company will, at the option of the Corporation, pay either a further bonus of £10,000 in cash (making in that case a total bonus of £20,000), or supply the Corporation annually in perpetuity with £450 worth of electricity for the purpose of lighting the public buildings at current prices. The Corporation are also given the option of applying this arrangement to the first bonus of £10,000.

Among other conditions that it is intended shall accrue from this scheme of transfer are these: The Company are to reduce the price of public lighting as from April 1, 1908, by ½d. per unit, which would represent a saving on the present public lighting account of about £880 per annum. Then, again, when the Company have paid a dividend of 4 per cent. on the ordinary share capital, the price of electricity for public lighting is to be reduced by a further ½d. per unit; and all the surplus profits after paying 4 per cent. are to be devoted to reducing the cost of private lighting till this has been lowered from 5d. to 4d. per unit. The Corporation also are to be bound to take electricity on the present scale from the Company for street lighting for seven years; but at the expiration of this period, the Corporation will be free to light the streets and public buildings with gas, should they so desire.

The Sub-Committee further looked well into the possibilities of the future, in the event of the retention of the undertaking in the hands of the Corporation; but they made no recommendation to the Electricity Committee regarding transfer or otherwise. However, the Electricity Committee, on considering the report of the Sub-Committee, decided unanimously to recommend the Corporation to enter into an agreement for the sale of the undertaking; and the decision has given the greatest satisfaction to the ratepayers.

PUBLIC LIGHTING OF LIVERPOOL.

Annual Report of the Superintendent.

The report for the past year of Mr. A. G. Smith, the Superintendent of Street Lighting, Gas Examiner, and Official Inspector of Meters to the Corporation of Liverpool, which has lately been issued, contains some interesting particulars in regard to the gas supply of the city.

The city is at present lighted by 18,783 lamps, 13,056 of them being in the old city and 5727 in the suburbs. They are distributed over 451¼ miles. The following table shows the number of burners used in the lighting of streets, courts, and passages:—

District.	Streets.			Courts.	Passages.	
	Flat Flame.	Incandescent.	Electric.	Flat Flame.	Flat Flame.	Incandescent.
Old City	239	9,207	210	833	2342	20
Suburbs	33	4,728	10	..	941	1
Totals . . .	272	13,935	220	833	3283	21

The following figures compare the present lighting (*b*) with that of 1905 (*a*):—

Mileage of Streets Lighted.	Price of Gas per 1000 Cubic Feet.	Total No. of Lamps.	Total Illuminating Power. Candles.		Total Maintenance Charges.
			Before Midnight.	After Midnight.	
(*a*) 445	2s. 4·8d. / 2 3·0	18,589	1,100,792	626,068	£47,665
(*b*) 451¼	2 3·0	18,783	1,111,932	635,260	46,630

The work of fixing incandescent in lieu of flat-flame gas-burners in the public-lamps was very light last year—only 10 lamps having been so treated; but the lighting of 3⅛ miles of new streets was carried out by the erection of 105 single incandescent gas-lamps. The lighting of 2½ miles of road was re-arranged during the year, involving the erection of 1 double and 30 single incandescent lamps, and the removal of 27 existing lamps to new positions; while 92 lamps were shifted owing to the widening of roadways and sidewalks, alterations to property, and other causes. On the 12th of March, the Committee took over the lighting, &c., of the lamps in Hartley's Village and on the Liverpool Land Company's Estate; and they were immediately superseded by those of the incandescent type. The lighting arrangements in Fazakerley are now as follows: Length of streets lighted by incandescent electric lamps, 0·5 mile; do. by incandescent gas-lamps, 1·75 miles; number of lamps (10 electric, 36 gas), 46; average distance between the lamps, 74 yards. By arrangement with the Mersey Docks and Harbour

Board, the lighting of the Floating Roadway Pier Head has been improved. In lieu of the 26 flat-flame globular lamps, 8 high-power lamps of the Scott-Snell type have been fixed, 3 only of which are chargeable to the Corporation; and the work of maintenance is carried out by the Dock Board. Of the 451¼ miles of road lighted at the close of last year, 436½ miles were by incandescent gas, 9¾ miles (principally back streets) by flat-flame burners, and the remaining 5 miles by electricity. The average distance between the lamps is 50 yards in the old city and 68 yards in the suburbs.

Early in the year the Committee decided to experiment with the non-lighting of the public-lamps during one week in midsummer, as it was felt that the period of lamplight was so short that no inconvenience to traffic would be experienced if such a course were adopted; while it would at the same time permit of the lighters taking the week's holiday granted by the Council. For this purpose it was decided that the extra day's money which was previously paid to the lighters each month should be retained by the Committee, and paid in a lump sum for the week in which the holiday was taken. Accordingly, on the 23rd of June the holidays commenced, and the lamps, except those on the tram poles, were not lighted; but, owing to the weather being of an unfavourable character for the experiment, and there being numerous complaints from the police, the Press, and the public, the experiment was not continued beyond the 25th of June. The question of the holidays of the lighters was raised at a subsequent meeting of the Committee, and a resolution was passed rescinding the new resolution regarding the week's holiday and pay, and reverting to the former system of an extra day's pay per month. On the 26th of July, however, the matter was again considered by the Committee, and it was agreed that in future one week's holiday per annum, with pay, be granted to each of the lighters, but that the holiday should be granted to only one man at a time in each section, and that the work of the absentee should be performed by the lamplighters on duty in his section. This arrangement will come into force next summer.

The work of lamplighting is carried out by 14 foremen and 183 lighters; the average number of lamps dealt with by each lighter being 111 in the city and 90 in the suburbs. From the 15th of May to the 31st of July in the city, and from the 1st of May to the 15th of August in the suburbs, the lamps are lighted at the lower rate only; the midnight visits for reduction not being made. In lieu of this, each lighter is employed for five days on lamp painting; and by this means one-third of the lamps and columns in the city are annually overhauled and painted. The entire maintenance of the columns, brackets, lamps, and fittings is undertaken by the Gas and Lighting Department, and the following (among other) work was carried out by 70 mechanics, &c.; the figures for 1905 being given for comparison:—

	1905.		1906.
On district—			
Columns fixed	177	..	140
,, reinstated	165	..	118
Lamps repaired	5,156	..	5,631
,, reglazed	15,887	..	18,684
,, changed	2,469	..	1,115
Visits paid by trimmers to incandescent gas-lamps	273,991	..	284,482
In workshop—			
Lamps repaired	4,267	..	3,391
,, reglazed	3,130	..	2,912
,, manufactured	37	..	25
In stores—			
Incandescent gas-burners cleaned, repaired and adjusted, &c.	4,610	..	4,788
New incandescent gas-burners adjusted only	1,543	..	2,134
Incandescent gas-burner chimneys cleaned	231,567	..	238,688
Regulators cleaned, adjusted, &c.	12,867	..	15,687
New regulators adjusted only	1,615	..	5,875

During the past year there were 228 accidents to street-lamps, and in 135 cases the police were able to ascertain the names and addresses of the owners of the vehicles causing the damage, and accounts to the value of £125 13s. 5d. have been rendered.

On the subject of gas-meter testing, the Superintendent expresses his pleasure at being able to report that this department of his work was self-supporting last year. The expenditure amounted to £437, while the fees reached a total of £446 7s. 9d., against £383 13s. 6d. in 1905, which was a record year; while the average for the last ten years amounts to only £270 4s. 6d. The following figures will show the extent of the year's work:—

	Gas Company's.		Sundry.		Prepayment.
Meters certified	8965	..	406	..	924
,, rejected	120	..	291	..	245
	9085	..	697	..	1169

The grand total is 10,951, compared with 9591 in 1905.

The work of testing for illuminating and calorific power, purity, and pressure the gas supplied by the Gas Company was carried out continuously during the past year. In addition to the ordinary tests, the Committee sanctioned one for the presence of carbon monoxide, as indicating the extent of the admixture of carburetted water gas. The statutory illuminating power of the gas is 20 candles when measured by a batswing burner, consuming 5 cubic feet of gas per hour; the burner in use being a No. 7 steatite batswing, approved by the Metropolitan Gas Referees. The gas is tested daily at the office; and, by arrangement with the Gas Company, the Examiner is empowered to test also by the portable photometer in any part of the city without notice. The results of the tests are as follows: Average illuminating value at office, 20·63 candles; in district, 20·46 candles. The gas is tested daily in the office for its calorific value by means of a Simmance-Abady calorimeter. Altogether 267 tests were made, showing an average of 788·15 B.Th.U per cubic foot gross, against 713·72 B.Th.U. per cubic foot last year. The Superintendent says this may be considered satisfactory. The average of 27 tests for carbon monoxide was 12·37 per cent.; indicating an admixture of 26·54 per cent. of carburetted water gas. The purity tests were satisfactory, and those made for pressure showed evidence of equable distribution.

On the subject of carburetted water gas, the Superintendent reports that, acting on the instructions of the Committee, he obtained, through Dr. Brislee, of the Liverpool University, 30 tests of the gas supplied throughout the city; from which it was ascertained that, in the south end chiefly, the gas contained an excessive admixture of carburetted water gas. Upon this report the Health Committee appointed a deputation to wait on the Board of Trade for the purpose of urging legislation with a view to the adoption of the Departmental Committee's recommendation, especially with regard to the maximum amount of carbon monoxide; and the Lighting Committee were invited to join. The Local Government Board were subsequently approached to receive the deputation, which, however, they declined to do; stating that no useful purpose could be served by such an interview.

The Superintendent reminds the Committee that at certain periods of the year great difficulty is experienced in obtaining a sufficient supply of gas to the street-lamps, owing to the deposition of naphthalene, which frequently has the effect of extinguishing the lamps, or reducing the supply to such an extent that the light obtained is useless for illumination. During the past year the Department received 9514 reports of such failures, against 8082 in the previous year. Nearly the whole of these stoppages were in the lamp-fittings, and were therefore attended to by the Corporation's own fitters; the remainder being dealt with by the Gas Company, as the obstructions were in their service-pipes. The Superintendent forwards each month to the Company a statement showing the number of failures; and he is assured by their Engineer (Mr. Edward Allen) that all possible steps have been taken to minimize the trouble, which is one that affects every gas undertaking.

At the close of the year, the Superintendent devised a new type of lamp for street incandescent gas lighting, which it is expected will reduce the maintenance charges. It is storm-proof, and as the lamp-cock is placed inside the lamp, it is confidently hoped that the troublesome naphthalene deposits will be reduced to a minimum. The Committee agreed to pay the fees in connection with patenting this lamp, on the understanding that the Superintendent would allow the Corporation the unrestricted use of it for all time in Liverpool. [An illustration of the lamp will be found on p. 543.]

The total charges in connection with the public lighting of the city and the supervision of the gas supply for the year amounted to £50,275, and a revenue of £3190 was derived from work, charged to other departments and bodies, which includes a large portion of the gas-fitting work of the Corporation; making a net expenditure of £47,085, against £48,566 in 1905.

INCANDESCENT GAS LIGHTING IN SCHOOLS.

At the Meeting of the Education Committee of the West Ham Corporation on Monday last week, the Architect presented a report (which was adopted) in regard to certain questions which had been raised as to the incandescent gas lighting in the public elementary schools of the borough. In the course of it, he made the following remarks:

In consequence of the bye-passes being kept alight during the day (and, I believe, in some cases during the night also), apart from unnecessary use of gas, the bye-pass lights were frequently blown out, owing to the practice in many of the schools of throwing the windows wide open, even during high winds; thereby causing a smell of gas throughout the schools. This difficulty had not arisen in the earlier schools fitted up with the incandescent light; and as I found it would take some time to find a remedy, I judged it expedient temporarily to close the bye-passes until the teachers and caretakers had acquired more experience with the new lights. The bye-passes are being gradually re-opened. The cost of closing the bye-passes varied from 3s. 6d. per school upwards; the average cost working out at 15s., and the total cost to about £25. The additional cost of fitting the bye-pass part of the burner varied up to as much as 9d. each, according to pattern of burner; and had they been entirely omitted a saving on the whole of the Council's schools of approximately £85 might have been effected. These bye-passes, I am informed, can be regulated under favourable conditions to consume as little as 1-30th of a cubic foot of gas per hour; but those in the schools were rated to burn from 1-10th to 1-8th of a cubic foot. The consumption of gas by the burners used in the schools varies from 4 to 10 cubic feet per hour, according to pattern—the average throughout the schools being about 4½ cubic feet; consequently 40 minutes of the full burner is equivalent to 24 hours of the bye-pass. Though in many cases, and in awkward situations, it is not unusual to keep the bye-passes burning continuously, the proper use of them in school lighting does not contemplate their being alight all the time. They should be lighted on foggy mornings, before the afternoon session, when it is dark before school closes, for use in the evening for school cleaning, and for occasional use of the rooms in the evening. An average of two hours per day for 120 days fairly represents the amount of lighting of this exceptional character, during a season involving a gas consumption by the bye-pass of 30 cubic feet. If bye-passes were not fitted, the ordinary burners would have to be alight for probably fully one-half of this time, involving a consumption of not less than 540 cubic feet. There is, therefore, or should be, a saving by using the bye-passes in a single quarter sufficient to more than pay for the extra cost of fitting, in addition to the great convenience they afford. On the other hand, the unnecessary burning of the bye-passes may involve a considerable consumption of gas where, as in the schools, there are a large number in use.

While on the question of gas consumption, I may mention that in 35 of the Council's schools fitted with incandescent gas there was a reduction in the gas consumed for the quarter ended Christmas last, as compared with the last quarter of 1905, of nearly a million cubic feet (975,100 cubic feet), and this notwithstanding that there has been one more night school this winter, and that there were during the summer numerous additions to the gas-cooking appliances fitted in the schools;

while throughout the schools there is a greatly improved light. There is an increase of 18,100 cubic feet at Three Mills, and 18,800 cubic feet at the Maryland Point Schools, which seems, in comparison with other schools, to need some explanation. A return shows that 252 mantle protectors were broken before they were used for school purposes—*i.e.*, before they were required to be lighted up during school hours. This number included the whole of the 13 non-provided schools and the seven Council schools fitted previous to the last summer, which had not been overhauled for the winter season. Except at the Three Mills School, where 49 are stated to have been broken, and the Hermit Road School, where there were 28, the number of breakages per school was insignificant. Of breakages after gas lighting was resumed for school purposes, the number returned is 1033. This included the 13 non-provided schools and five schools previously fitted; and the total number of burners to which this number of breakages refers is between 7000 and 8000. There are six schools where the breakage was abnormal—these schools accounting for nearly two-fifths of the total breakage; whereas at the remaining 50 schools it was comparatively slight. This abnormal breakage I attribute partly to the fact that the windows were open a great deal while the gas was alight, causing a great amount of cold air to impinge on the hot glass, and partly to there having been too much gas passing through the burners, causing undue heat. These six schools are among those in which there has been the largest reduction in the gas consumed, as they were all fitted originally to burn 60 cubic feet per hour per class-room, as against the present fittings consuming from 24 to 30 cubic feet; and, consequently, when the gas was turned full on at the main cock there was too much pressure. The ground-glass protectors used in the first instance do not appear so well able to stand the extreme and rapid change from heat to cold as the clear-glass ones now being used, though the clear glass does not give so good a light as the ground glass. There must necessarily be a little risk to the children where glass is used overhead, and for this reason I have hitherto avoided using fittings needing glass. The risk, however, I consider is very slight. The important point in school lighting is that the light shall be as evenly distributed as possible; and the London Education Committee's rule, I am informed, is that no child shall be more than 6 feet (recently altered to 5 feet) away from a light. In the Council's schools, the dispersion of the lights has not been carried to so great an extent as this; and with the Jena clear-glass protectors now being used, I think the risk will be reduced to a minimum.

WATFORD AND THE GAS SUPPLY OF RICKMANSWORTH.

A good deal of what one member termed "carping criticism" was heard at the meeting of the Rickmansworth Urban District Council last Thursday week, when the Gas Committee reported that they had considered an offer by the Watford Gas Company to supply them with gas in bulk, but regretted that at the present moment they were not in a position to entertain it.

Mr. Taylor, in reply to a question as to whether the Committee had made many inquiries as to the terms on which Watford were prepared to supply gas in bulk, said the Committee had considered the matter very carefully, and came to the conclusion that the present was not an opportune time to entertain the application. They were developing new plant, increasing their output, and reducing the cost of manufacture; and the quality of the gas was superior to that supplied at Watford. He did not think Rickmansworth people would like to put up with 14-candle power gas, such as they had at Watford; and he could see no object in taking a supply from the Company. Mr. Couchman, who had put the question, remarked that the explanation was not satisfactory to him. He looked upon the suggestion, which came voluntarily from the Watford Gas Company, as the only possible hope of escape from the intolerable position in which they found themselves. He would propose that the matter be referred back to the Committee, with instructions to approach the Watford Company. The amendment was seconded by Mr. Oddie; and Mr. Kennedy, in supporting it, said they had a most uncomfortable millstone round their necks, and he thought they should lose no opportunity of getting rid of it. Mr. Ibbotson contended that to get gas in bulk from a neighbouring Company would be a step in the wrong direction. Their difficulty was not in making gas, but in meeting loans and interest. The purchase of gas from Watford would not help them a bit. Rickmansworth should manage its own affairs. To go to Watford would mean the loss of considerable labour in Rickmansworth.

Replying to these remarks, Mr. Taylor said that great injury was being done to the undertaking owing to these continual depreciations of the Council's property. They were turning a difficult corner; but some individuals seemed to think they were going to gain favour with the public by depreciating the value of their property. He did not like to say how he should characterize such conduct. To continually cry "stinking fish" was a very bad policy; and to keep saying that they had got a very bad egg, was most unwise. They might think he was an optimist; but he was not. He had looked into the matter most carefully; and some of the wisest men on gas matters in the country said the undertaking could and ought to be run at a profit. He was therefore not prepared to accept the views of a few irresponsible people who knew nothing at all about gas manufacture, in the face of the opinion of eminent experts. They said that under proper management the undertaking ought to go forward. They had just got rid of one of their most serious hindrances; and now they were able to breathe freely, and would, he believed, go forward. What they needed was not hostile, adverse, carping criticism, but efficient help to carry on what ought to prove a profitable thing for the town.

Mr. Coutts said, assuming the gas-works were such a millstone, how did they suppose purchasing gas from Watford was going to get rid of it? Did they contemplate that Watford would take over the whole concern and pay them the money they had spent on it? Mr. White pointed out that the feeling of the people was that if Watford could supply gas at 2s. 8d. per 1000 feet, it was strange that Rickmansworth could not manufacture it for less than 4s. 6d. Mr. Franklin believed that Rickmansworth would be able to manufacture gas much cheaper when they had a fair chance; but Mr. Kennedy still maintained that the proposal from Watford, which, he said, might enable them to extricate themselves from the quagmire into which they had got, ought not to be passed over in an off-handed manner. He thought they should be quite prepared to meet anybody who was prepared to relieve them of their burden. The fact that a person had been able to deceive the very elect up to the last moment was enough to condemn the whole management of the concern. He was not at all inclined to endorse Mr. Taylor's complacent view of the circumstances. The Chairman (Mr. C. Barton-Smith) said that personally he did not think the gas concern was so bad as had been represented. He did not see any hope of relief or any good likely to come from any correspondence with the Watford Gas Company. He did not understand how their offer to supply Rickmansworth with gas at a low figure was going to help them in connection with the undertaking.

Only three members voted for the amendment, which was lost.

GAS AND ELECTRIC LIGHTING IN NEW YORK LAST YEAR.

Second Report of the State Commissioners.

The New York Commission of Gas and Electricity have lately presented to the Legislature their second annual report, dealing with the matters which came within their jurisdiction in the twelve months ending Dec. 31 last. According to an abstract of the report in the "American Gaslight Journal," the most important recommendations refer to questions of procedure. As the statute regulating the work of the Commission now stands, complaints can be made to the proper municipal authorities by 100 or more consumers of gas or electricity in the territory of the corporation complained of. The Commission recommend their amendment so that complaint may be made by 25 customers in the territory served, where it contains less than 1000 population, by 50 where the population is between 1000 and 5000, by 75 where it is between 5000 and 10,000, and by 100 in all other places. The Commission further recommend an amendment which will require a company incorporated before the law came into operation to obtain the consent of the Commission before exercising powers under a franchise hereafter obtained from the local authorities. Such companies are now free to invade the territory of established companies without first securing this consent. Further recommendations are the following: That power be given to the Commission to revoke all certificates of authority to transact business where the construction of the plant in question is not begun in good faith within a certain period from the date of issuing such a certificate; and that owners of municipal gas or electric plants should be compelled to make annual reports to the Commission. Attention is called to the fact that no provision is made, upon the application of a company, for a revision of prices after the expiration of three years for which the price is fixed. The Commission consider it to be only fair that a company should have the same right as the consumers to apply for a revision of the price fixed by it, as changing conditions might increase the cost of production and distribution.

The report shows that there are 426 corporations, municipalities, and individuals furnishing gas or electricity for light, heat, or power in the State coming under the supervision of the Commission. The capital aggregates $456,000,000, and the gross income approximates $75,000,000 per annum. During the year ended Dec. 31 last, the Commission had before them 74 applications, upon all but three of which public hearings were held. During the year, the applications of 29 companies for certificates of authority for consent to issue stocks or bonds, and for consent to increase issues of stock or bonds, were considered by the Commission. The capital asked for aggregated $9,492,000; while the sum allowed by the Commission was $6,837,000—a reduction of $2,655,000, or approximately 28 per cent. In reducing the amount of stock and bonds applied for, the Commission followed their policy of requiring each company applying for consent to make such issues to furnish them with a statement in detail as to the purposes for which the proposed issue was to be used. In no case did the Commission allow an issue except for actual improvements and extensions to plant. In the past twelve months, the Commission received complaints as to the price and quality of gas or electricity from Albany, Buffalo, Rochester, Watertown, Mount Vernon, and Nyack. Complaints were filed with the Commission prior to Jan. 1, 1906, against the Consolidated Gas Company of New York and the subsidiary Companies, and the Brooklyn Union Gas, the Syracuse Lighting, the Plattsburgh Light, Heat, and Power, the Lozier Light, Heat, and Power, and the Auburn Gas Companies. The report reviews the results accomplished by an investigation of the complaints. Reductions in the price of gas were made in 14 cities and towns in the State, and in the price of electricity in more than 30 places. The quantity of gas sold to consumers and for public lighting in 1906 was 39,858,755,381 cubic feet, against 37,914,016,000 cubic feet in the preceding year—an increase of about 5 per cent.

The report shows that although gas for illuminating purposes has been supplied in the State since 1823, no regular or systematic inspection or examination has been made of the purity and illuminating value of the product supplied, except in New York City, until the past year, when the Commission established a department for these purposes. Tests were made in practically every section of the State; and the results showed the candle power of the gas furnished to be very low. An order has been issued by the Commission compelling all companies furnishing annually 15 million cubic feet of gas and upwards to instal an improved photometer for use in making frequent tests of illuminating power. In the course of the year, 350,158 meters were inspected and sealed by the State Inspector. Of this number, 5548 were private meters, 1446 of which were found to be fast, 883 slow, and 3219 correct. The Commission received reports of 540 accidents, of which 439 were slight and 101 serious, and 28 of them were fatal. The Commission has notified the various companies that they have under consideration a preparation of a uniform system of book-keeping; and they have invited them to furnish a classification of accounts employed and to offer suggestions.

SYDNEY (N.S.W.) WATER SUPPLY.

The Cataract Dam.

In a recent number, "Engineering" had an illustrated description of the Sydney Water Dam—the largest of its kind in the southern hemisphere—which is expected to be finished in the course of the next few months.* It is situated within the watershed of the Prospect reservoir, which for about twenty years has been the source of the water supply of the city of Sydney; and it has been constructed to supplement the storage. Occasionally, for some years past, and especially in 1902, severe droughts have occurred, and the reservoir became dangerously low. Owing to this, and to the concurrent steady increase in the population of the city and suburbs, serious shortage of water was feared; and though the inhabitants were never reduced to a limited supply (except occasionally for watering gardens), it was felt that, in view of the future, more of the water escaping during the rainy years must be impounded.

The water supply of Sydney is derived from the Nepean and Cataract Rivers. The catchment area of 354 square miles, with the good rainfall which is characteristic of the coastal districts of New South Wales, is ample for the requirements of the city, even supposing enormous expansion. But the existing storage at Prospect (only 5502½ million gallons by gravitation) is quite inadequate; and, further, as the water from the rivers mentioned is conveyed to the reservoir by a system of canals and tunnels, having a daily capacity of only 150 million gallons, the storm flow of the rivers cannot be fully utilized.

For many reasons, the original dam could not be raised. The plan, therefore, was adopted which has been so successfully carried out in the New York supply, where the Cross River dam was recently built within the watershed of the new Croton dam reservoir—but at a much higher level. In order to increase the storage, a masonry and concrete dam is being erected on the Cataract River; and in this way the storage capacity of the Prospect dam will be increased by no less than a possible 21,412 millions. The site is highly favourable for such a work, as will be judged by some of the following figures, which give the main dimensions.

	Feet.
Length of dam	811
Height above river-bed	154
Depth below ,,	40
Top width	16
Bottom width	158
Maximum depth of stored water	147

The area covered by water is 2145 acres. The work originated in the recommendation of a Royal Commission appointed in March, 1902; their proposal being submitted to the Parliamentary Standing Committee on Public Works, who reported favourably in July, and the Act of Parliament authorizing construction followed on Oct. 28 of the same year. Operations were at once put in hand, and the dam was commenced under day labour; but a Ministry more favourable to the contract system having come into power, the work remaining to be done in April, 1905, was let to a contracting firm, the plant on hand being transferred to them, and the date of completion stipulated to be April 10, 1907.

The body of the dam is composed of cyclopean rubble masonry, consisting of blocks of sandstone weighing from 2 to 4½ tons, built to break joint both vertically and horizontally, and to have a maximum of bond. The stones are bedded in cement mortar, and the vertical joints are made with concrete. The proportion of blocks to concrete and mortar is approximately as 65 : 35. The up-stream face consists of concrete blocks, 5 ft. by 2 ft. 6 in. by 2 ft., set upon, and jointed with, special cement mortar, and backed by an average of 3 feet of basaltic concrete. The down-stream face is made of concrete, 6 feet thick. Reinforced concrete is used in the construction of the valve-chambers at the base of the dam.

A bye-wash to pass surplus flood, with a weir 730 feet long, is provided. The top of the latter is about 150 feet above the river bed; the overflow water joining the river about one-eighth of a mile below the dam. The top of the dam is 7 feet higher than the top of the bye-wash weir. Two 48-inch pipes with valves, communicating with outlet-wells and sluice-valves in the up-stream face of the work, will form the permanent outlet; but two additional 48-inch pipes, making four in all, are provided to pass the river flow during construction. The valve-house on the down-stream side of the dam is roofed with ferro-concrete, to provide against damage by water topping the work during construction; and the contracts provide that the valves shall be left open till the lowest portion of the wall reaches a level of approximately 80 feet above the river bed.

In connection with this provision, a remarkable coincidence, which resulted in the discharge of an enormous volume of water over the dam, occurred. An exceedingly dry period of fifteen months' duration resulted in the depletion of the city supply; indeed, so small was the flow of the river during this period that one 48-inch pipe more than sufficed to carry it off. An arrangement was accordingly made with the contractors that the valves should be closed, and water, if any, impounded on Aug. 30 last. Two days previously, work was being concentrated upon the lowest portion of the wall, then 76 feet above the river bed—the gap being about 65 feet in width. The 29th was showery; and on the 30th, at 5 p.m., the valves were closed. At 6 p.m. the same day, after fifteen months of dry weather, heavy rain—amounting to 10 inches—fell in the catchment area; and by 6 o'clock a.m. on the following day the water was flowing over the dam to a depth of 16 feet in the gap—the lake above the dam holding at the time approximately 2000 million gallons. The engineers opened one of the 48-inch valves to reduce the surcharge; but it was not considered advisable to open the other three, on account of the vibration likely to result from the high velocity, as the fixing of the valves was not completed. Rain ceased on the 31st of August, and on the 3rd of September the discharge from the open valve and over the wall had reduced the level of the lake to that of the top of the wall—viz., 76 feet—when the valve was partially closed and work resumed. No damage was done to the structure, though one or two blocks of sandstone which had not set were carried from the top of the wall, and struck the roof of the valve-house in falling.

As regards the general plant, the power-house supplies three units of 65 kilowatts, working 14 electric motors varying from 8 to 40 H.P. Two electrically operated Lidgerwood cableways, each having a span of 1100 feet, handling 4½-ton loads, are erected above the dam. The towers of one set are stationary, and the other traversing—their height being 57 feet. Special Lidgerwood electric hoists are provided, with double drums 53 inches in diameter, operated by two direct-current motors, designed for 500 volts, and provided with series parallel controllers. The hoists have a maximum speed of 1200 feet per minute. There are six 4-ton cranes driven by electric motors, and six travelling steam-cranes—four of 10 tons, one of 5 tons, and one of 3 tons capacity. There is also a complete concrete-mixing plant. At the quarry supplying the broken stone, there is a crusher producing 40 tons per hour; a revolving screen separating the metal into different bins.

The estimate for the dam was £341,650; but the cost is expected to be only about £325,497, of which £235,995 is for the concrete used. Mr. L. A. B. Wade, M.Inst.C.E., the Chief Engineer for Rivers, Water Supply, and Drainage, is responsible for the design and execution of the structure. He has been assisted by Mr. E. M. de Burgh, M.Inst.C.E., of the same department, who has the principal charge of the work; and Mr. J. Symonds is the Resident Engineer.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Last night Mr. A. Wilson, the Engineer and Manager to the Gas Department of the Corporation of Glasgow, delivered a popular lecture upon "Gas and its Uses," in the Blackfriars Parish Church Hall, in the Dennistoun district of Glasgow—Bailie Wallace presiding. There was a large audience. As may be supposed, being one of a series promoted by the Corporation, the lecture was of an educational nature, dealing with the most up-to-date appliances in which gas is used, and making it clear to the public how they may get the best value from the gas in lighting, cooking, and heating. Afterwards a number of slides were shown of the plant at Provan, the working of which was described.

The Corporation of Greenock have remitted to a Sub-Committee to prepare a draft Provisional Order, which they propose to make application for next November, and in which, among other things, they are to ask for powers for the differentiating of the price of gas.

The following have been selected as a short leet for the post of Manager of the Corporation Gas-Works at Kirkintilloch, which is about to become vacant by the transference of Mr. W. Wilson to Falkirk: Messrs. J. Baxter, Forfar; J. Bell, Airdrie; W. Kellock, Kilsyth; J. M'Leod, Glasgow; H. G. Ritchie, Kirkcaldy; H. Rule, Falkirk; J. Stewart, Lanark; and J. Wynne, Carnoustie.

At a meeting of the Kilmarnock Town Council last week, the Gas Committee reported that they had considered the report of a Sub-Committee appointed to consider proposals for the letting out of gas-heating appliances; and that they had unanimously agreed to recommend: (1) That gas-fires, radiators, and heating-plates, at a net cost of from 17s. 6d. to 50s., be hired out at an annual rental of 10 per cent. on net cost, and above this value at 15 per cent.; (2) that fires, &c., under 17s. 6d., and all over £5, be sold only and not hired; (3) that if a consumer desires to purchase the fire within a period of two years from the date of hire, the full sum paid for hire be credited to the purchase, and after two years 50 per cent. only of that sum; (4) that in future all fires and cookers be fixed free (the present practice being to fix cookers up to 6 feet of piping); (5) that all hires be paid in advance. This minute was adopted by the Council without comment, and is already in operation.

Complaints about gas not giving sufficient light are common; complaint about its giving too much light is unique. Yet this is what a statement by Sir Robert S. Ball, the celebrated astronomer, made in a lecture in Edinburgh the other evening, amounts to. A few years ago a Mr. Anderson, of Edinburgh, came prominently before the public as the discoverer of a new star. He had on more than one occasion previously distinguished himself in the same line—a circumstance which indicated an exceptional amount of vigilance in watching the celestial bodies. As a matter of fact, Mr. Anderson spent a great part of the hours of darkness in his own garden, keeping a look-out upon the heavens. The statement of Sir Robert Ball was to the effect that he had discovered that Mr. Anderson had had to leave Edinburgh for a reason which was very creditable to the authorities—that the streets were now as light at night as during the day, and that the city was unsuitable for astronomical observers. It is very flattering to the Corporation of Edinburgh to be told by so eminent an authority that their efforts to improve the street lighting of what was, till quite recently, regarded as one of the worst-lighted cities in the United Kingdom, have been so successful. We must sympathize with Mr. Anderson in being driven away to pursue his favourite enjoyment amid less happy surroundings, even though the reason be a good one.

Somewhat of a sensation has been created in Dundee by the action of the Auditor of the water accounts of the city for the past year, in ordering a surcharge upon the Convener of the Water Committee—ex-Provost Ballingall—of £24 of the costs of the inspection by the Committee at Lintrathen last June. The Auditor—Mr. J. C. Robertson, C.A.—in an interim report to the Water Treasurer, says that of the total sum of £104 he disallows £24; and he orders this sum to be paid to the Treasurer by the Convener within one month, reserving to the Convener all claims competent to him for relief against the other members of the Committee. In a note to his order, the Auditor says that he has repeatedly requested the Engineer to impress upon the Convener the necessity of restricting the numbers invited and the expense incurred at the annual inspection, with an intimation that he would be obliged to disallow what he considered unwarranted expense; that a special warning was given prior to the last inspection; but that, in deference to use and wont, he has allowed this time for more outside official guests than he will be prepared to do in future. The persons invited were all the Water Commissioners, along with past Conveners, Lord Provosts and Provosts of the city, the four Conveners of the Harbour Trust, the Sheriff, two members of the Dundee Chamber of

Commerce, the factors on the Airlie estate, the parish minister of Lintrathen, and the head officials of the Corporation departments; the total number present being 60. On being interviewed upon the subject, Mr. Ballingall said that the list of guests was not drawn up by the Water Committee, but by a Committee appointed by the Water Commission as a whole, and that it is his intention to pass the order for surcharge on to the Lord Provost, as the Chairman of the Commission. When the arrangements for the inspection were being made, Mr. Johnston, one of the Commissioners, objected to the expense which was being proposed, and moved that it be restricted to £50; but he was not supported, and the previous practice was followed. He has been in communication upon the subject with the Lord Advocate—Mr. T. Shaw, K.C.—who has written to him that the provisions for auditing the accounts are those contained in the various Acts dealing with the Dundee water supply, and, that being so, the provisions under which the Secretary for Scotland acted in the case of the Blairgowrie special water district do not apply to Dundee, but that the question of the legality of particular charges is primarily one for the determination of the Auditor of the accounts. The feeling is prevalent that the Dundee Water Acts do not give the Auditor power to surcharge, and that all he can do, in the absence of statutory power, is to call attention to the facts, and state his objection to any charges he might consider unauthorized and objectionable. It is probable, therefore, that the order for surcharge will be repudiated by the Water Commissioners.

The Corporation of Arbroath are finding difficulties to thicken upon them in connection with their scheme for the introduction of a gravitation water supply. This week, in the Court of Session, application was made on behalf of the Earl of Southesk, the Earl of Dalhousie, and a firm of salmon fishers in Montrose, to have the Corporation interdicted from abstracting water from the Noran stream until they have completed their compensation reservoir at Glenogil, and are sending down the quantity of compensation water which is fixed by statute—not less than 625,000 gallons in the course of 24 hours. The application is made in respect of injury to salmon fishings. The Corporation, it is said, in October, 1905, applied to the Fishery Board for permission to take a small quantity of water; but the request was declined. Notwithstanding this, it is asserted, a large quantity is being taken. It is pointed out that the River South Esk is peculiarly devoid of tributary streams, its main tributary, and most important source of supply, being the Noran, and that the water of the Noran, being very pure, mitigates the sewage discharges in the lower reaches of the river, but that the actions of the Corporation are, in great measure, depriving the complainers of this benefit. The complainers reserve all claims of damage occasioned by the actings of the respondents. Lord Guthrie on Tuesday ordered the application to be served upon the Corporation, and allowed them five days to answer it. Answers have not yet been lodged; but the Town Clerk has been instructed to communicate with the agents for the complainers, which looks as if it were the intention of the Corporation to endeavour to come to terms with the complainers.

The water supply to Loanhead, in Midlothian, was turned on on Wednesday, after the relaying of the mains. A hundred and twenty years ago water was brought in, in iron pipes, from the eastern portion of the Pentland Hills; and the present is the fourth augmentation which has been effected since then. On this occasion, a 3-inch main has been lifted, and a 5-inch one laid. The work has cost about £1500. Mr. Somerville Carfrae, C.E., of Edinburgh, was the Engineer. The ceremony of turning on the water was performed by Mrs. Kerr, wife of the Provost of the place. After the ceremony, a cake and wine banquet was held in the Masonic Hall in Loanhead.

Quality of Leeds Gas.

Judging from an article which appeared in the "Yorkshire Post" a few days ago, Leeds is in for an agitation regarding the candle power of the gas. It is remarked that, "whatever may be the ultimate blessings of the lower grade of gas supplied by a beneficent Corporation, it is beyond dispute that the present is a period of great trial and tribulation to Leeds householders, and particularly to those living in some of the suburban districts of the city." This, of course, refers to the fact that Leeds has joined in the prevalent view that modern appliances have rendered high-candle power gas unnecessary. The illuminating power was formerly 18 candles; but now the Corporation are authorized to supply gas of 14-candle power. The Corporation, however, decided not to take full advantage of their powers, but to keep the gas as nearly 15 candles as possible. On this point, the "Yorkshire Post" says: "Since the reduction in price a few months ago, we understand that the quality has never been under the wretched minimum allowed by the Act, though it has on a number of occasions been below 15 candles—the standard which the public have been led to expect from a considerate Committee. Surely, it ought not to be impossible to always maintain it at 15-candle power." In the course of investigation, our contemporary has discovered that "the municipalization of gas-works does not necessarily mean a cheaper commodity than that which a company can supply;" and some interesting comparisons between Leeds and Sheffield are made. The Newcastle-on-Tyne and York Gas Companies are also quoted as examples of excellent management.

Yarmouth Town Council and the Water Bill.—The Yarmouth Town Council have, by a large majority, decided to oppose the Great Yarmouth Water-Works and Lowestoft Water and Gas Bill. In moving the resolution to this effect, the Deputy-Mayor remarked that it was only a sense of duty that placed them in opposition to men so esteemed as the Directors of the Water Company in regard to the Bill, which in the main seemed to be the old Bill that the Corporation had to defeat last year at the heavy expense of £3000. The Company thought there was no other source than the river; but Parliament had not granted power for a river source of supply for thirty years. Some clauses had been introduced in the new Bill as safeguards; but these seemed of little value.

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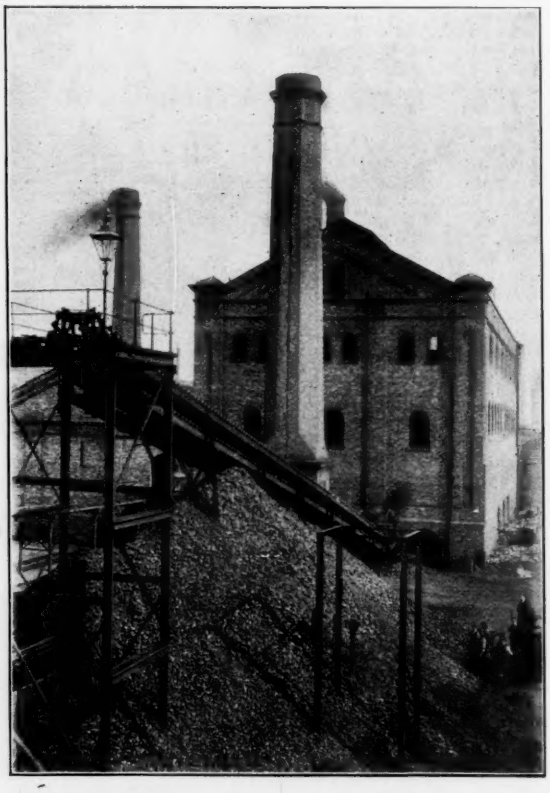

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Telephone: 50 SMETHWICK.

London Office:

13, IDOL LANE, EASTCHEAP, E.C.

NEW CONVEYOR CO., LTD., SMETHWICK.

CURRENT SALES OF GAS PRODUCTS.

Week ending Feb. 23.

There is little alteration in tar products so far as London is concerned. Large inquiries for pitch continue to be received; but makers are well sold, and disinclined to quote ahead just now. 90 per cent. toluol is very firm; but benzol is hardly so strong—the latter being quoted 11½d. to 11⅝d. per gallon. 60° crude carbolic is 1s. 8½d.; but crystals are a shade easier. Sulphate of ammonia is still rather disappointing, Deliveries are being well taken; but prices remain quiet—being on Beckton terms £12 2s. 6d. to £12 3s. 9d. for this and next month.

LIVERPOOL, *Feb.* 23.

Sulphate of Ammonia.

The market has been somewhat inactive during the week, and the tone at the close is rather quiet with a slight reduction in prices, which are £11 17s. 6d. f.o.b. Hull, £12 f.o.b. Liverpool, and nominally £12 1s. 3d. to £12 2s. 6d. f.o.b. Leith. There have been comparatively few parcels placed upon the market, and, although these realized previous values, there has been a scarcity of new orders, and an absence of any haste to complete February requirements. Next week will show what these are; and meantime an amelioration of the weather conditions should give some stimulus to the market. An important feature in the situation is that there are practically no parcels offering for delivery at Leith, all the oil makes in the North being evidently very fully sold. In forward delivery, no first-hand business is reported; the ideas of buyers and producers being still too divergent.

Nitrate of Soda.

This article is steady at 11s. 6d. per cwt. for ordinary and 12s. for refined quality.

LONDON, *Feb.* 23.

Tar Products.

Markets have been quiet during the past week, and there has been very little alteration in values. There is no change in pitch. It is still possible to buy at about 25s. on the east coast and 24s. on the west coast for delivery this side of June; but regarding September-December, manufacturers at present refuse to quote, as they believe they can do no harm by waiting. No orders are obtainable on the Continent for prompt delivery except at very low figures; while for forward, the prices indicated by buyers are just now far too low to induce dealers to sell. The demand for creosote continues very firm indeed; and, though second-hand oil could be purchased in London at fairly low prices, London manufacturers are well sold and very firm in their ideas, and would not consider anything under 2¼d. per gallon. In the Midlands, it is reported that 2⅜d. has been offered and refused; manufacturers holding out for 2½d. In the North, business has again been done at 2d.; but the majority of manufacturers are well sold, and will not entertain any business at under 2⅛d. Benzol, 90 per cent., is very quiet. Business has been done at 8d., naked, at manufacturers' works in the Midlands; while sales are reported at under 10½d. on the east coast. In London, manufacturers would probably accept 11d. for prompt delivery, at which price it is said that country makes have been sold in this district. There is very little offering in 50-90 per cent., which is firm. No business is reported in toluol, which is scarce; manufacturers being well sold, and not inclined for further business except at good prices. There is no alteration in the market for carbolic acid, and manufacturers refuse to accept the prices offered. There is no change in the position of crystals. The smaller makers appear well sold, and not disposed to quote for any further quantity just at present; while the larger makers report that they receive orders from time to time at the current market quotations. The market for solvent is quiet. Business has been done upon the east coast at 1s. 1½d. In London, it is improbable that business could be done at anything under 1s. 4d. to 1s. 4½d.; while for the finer qualities very good prices are reported to have been paid. In anthracene, some quantity was sold in London recently at 1½d. per unit.

The average values during the week were: Tar, 13s. 6d. to 17s. 6d. Pitch, London, 25s. 3d. to 25s. 6d.; east coast, 25s.; west coast, 23s. 9d. to 24s. 6d. Benzol, 90 per cent., 10d. to 11d.; 50-90 per cent., 11¼d. to 11⅜d. Toluol, 1s. 1⅛d. to 1s. 2⅛d. Crude naphtha, 4⅜d. to 5d.; solvent naphtha, 1s. 1⅛d. to 1s. 3½d.; heavy naphtha, 1s. 2d. to 1s. 4d. Creosote, London, 2⅛d. to 2⅛d.; North, 2d. to 2⅛d. Heavy oils, 2¼d. to 2⅜d. Carbolic acid, 60 per cent., 1s. 8¼d. to 1s. 8⅜d. Naphthalene, £6 to £10; salts, 35s. to 40s. Anthracene, "A" quality, 1½d. to 1⅝d.

Sulphate of Ammonia.

There is no alteration in the market for this article. Outside London, makes could be secured at about £11 17s. 6d. on Beckton terms; but the principal Gas Companies, being well sold, are very firm indeed in their ideas, and refuse to quote anything under £12 5s. for February-June. In Hull, £12 has been offered and refused for one of the best makes; but inferior quality could be bought at £11 17s. 6d. to £11 18s. 9d. In Liverpool, business is reported to have been done at £12, and at £11 17s. 6d. for discoloured. In Leith, there is very little available, and dealers would no doubt pay £12 for prompt delivery.

Tynemouth Water Supply.—An arbitration has lately been held to determine the amount to be paid by the Tynemouth Corporation in respect of an easement for a line of pipes through the Netherwitton Estate of Mr. Trevelyan. The amount claimed by the owner was £4500; and this was duly supported by witnesses on his behalf. On the other hand, those for the Corporation considered that 1d. per lineal yard per annum was a fair rental value for the easement; and, basing their calculation on this figure, they estimated that £973 was sufficient compensation. The Umpire (Mr. Ernest Moon, K.C.) has awarded £1140 as the amount payable, with of £5 as compensation for damage to roads through the estate, if the owner can prove that he is entitled to it.

UNDISPUTED FACTS

Regarding the efficiency of the **"BLAND"** Light, the Chief Engineer and Manager of the Edinburgh and Leith Corporations' Gas Commissioners,

MR. W. R. HERRING, M.INST.C.E.,

writes:

"Adverting to your request that we should test the 'Bland' Inverted Gas-Burner, which you left at my Office about a week ago, I beg to inform you that we have now completed our experiments, and I am happy to be able to report that the results we obtain are fully equal to what is claimed in the circular, and that this Burner is undoubtedly one of the best on the market."

80-CANDLE POWER 3 CUBIC FEET PER HOUR.

For full details respecting the **BLAND** *light for* **Church, Factory, Shop,** *and* **Domestic Lighting,** *write to—*

BLAND & CO., Ormond House, 63, Queen Victoria Street, LONDON, E.C.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The weather in this county during the last week has been severely cold. The coal trade continues firm at the full quotations of last week. House coal especially is in strong demand. The proposed eight-hour day in mines is regarded with disfavour. At a meeting of the Lancashire and Cheshire Miners' Federation, held in Manchester on Saturday, it was stated that a meeting of the Coal Conciliation Board had been arranged for Tuesday, March 5, to consider an application which had been made for a further 5 per cent. advance in wages.

Northern Coal Trade.

There has been a little ease in the coal trade of the North-east—due in part to the high prices that are asked being above what consumers readily give, and to the effects of the delay of steamers through the storms. In the steam coal trade, best Northumbrians are about 14s. 9d. per ton f.o.b., second-class steams 13s. to 13s. 3d., and steam smalls are steady at about 8s. to 8s. 6d. The collieries are, with few exceptions, working well; and some of them have sold their produce over a considerable part of next month, though sales over the shipping season are scarcely so heavy in amount as has sometimes been the case at this period. In the gas coal trade, there is a good demand, though it is rather showing signs of the falling off that is certain as the days lengthen. Prices of Durham gas coals vary, according to quality, from about 11s. 9d. to 12s. 9d. per ton f.o.b., but not much coal seems to be sold just at present, though small lots for export may be. The idea of buyers appears to be that expressed at the Newcastle Gas Company's meeting by the Chairman, that "prices might not be so unfavourable when the time arrived for purchasing." In the meantime, discussion as to possible prices continues; but it cannot be said to disclose new facts. In the coke trade, demand is steady, and prices are firm; so that gas coke has good support. Current prices for good gas coke vary from about 13s. 6d. to 14s. 6d. per ton, f.o.b., according to the shipping port.

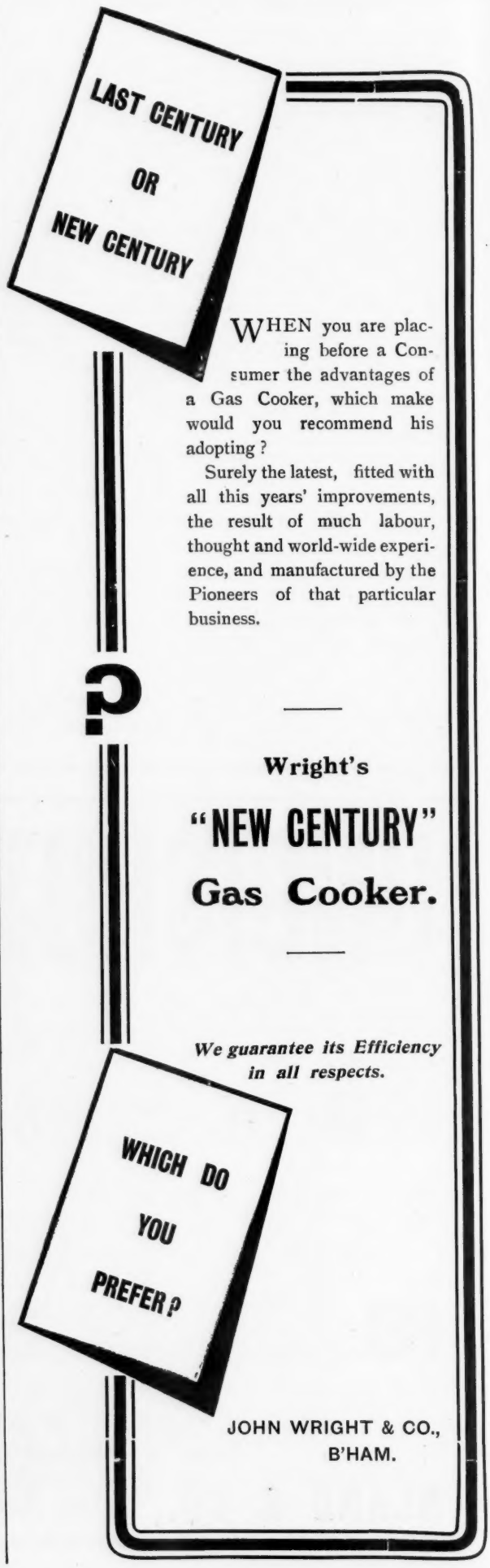
Scotch Coal Trade.

The demand for all classes of coal continues strong, and is likely to be so for some time. There is great activity in the shipping line, though it was somewhat checked by the stormy weather of last week. The prices quoted are: Ell 12s. to 13s. 6d. per ton f.o.b. Glasgow, splint 12s. to 12s. 6d., and steam 11s. 6d. to 11s. 9d. The shipments for the week amounted to 255,135 tons—a decrease of 13,391 tons upon the preceding week, but an increase of 27,029 tons upon the same week of last year. For the year to date, the total shipments have been 1,774,562 tons—an increase of 264,155 tons upon the corresponding period of 1906.

The Charge for Water in London.

The Parliamentary Committee of the London County Council presented a long report, at the meeting of the Council last Tuesday, on the Metropolitan Water Board (Charges, &c.) Bill, in which a uniform charge for water of 5 per cent. on the rateable value of the premises supplied is proposed. A Special Committee had been considering the provisions of the Bill; and the Council were recommended to petition against it. The Committee found that the Bill in no way provides for uniform scales of charges, but merely fixes certain maximum charges, and leaves it open to the Board to make any charge within these limits. The "domestic purposes" charge is based on rateable value, and the loss caused by their new proposal is put at £10,000 a year. The Committee criticized the fact that baths capable of containing, when filled, more than 50 gallons of water are excluded from the "domestic supply." As the large majority of baths are capable of containing more than 50 gallons they would be excluded, and the consumer would derive no advantage from the new scale. The charges for trade purposes now in operation in five districts would be repealed by the Bill; and the Board would therefore be under no obligation to supply for these purposes. The Committee considered this obligation should be maintained. Except for public purposes (6d. per 1000 gallons), all charges are the maximum; and the Board may enter into agreements of any kind. The Council will petition against this Bill and also the Board's Various Powers Bill. The Holborn Borough Council will also oppose the Charges Bill. In the opinion of the Law and Parliamentary Committee, even if the percentage should be uniform, the charge for water would be different, owing to the rateable values in every borough varying according to the locality and the ideas of the rating authorities. Outside the county boundaries, it was not incumbent upon an Assessment Committee to make periodically new valuation lists; and in many parishes the valuations were far lower than they would be were this not so. Owing to this fact, many persons outside the county area would pay a lower rate for their water than those within the boundary. If the water-rate were increased to 5 per cent., as proposed, the Holborn consumers would pay between £5000 and £6000 per annum more for their water for domestic purposes than they do at present.

Haywards Heath and District Water Supply.—Last Tuesday, Mr. F. J. Willis, on behalf of the Local Government Board, held an inquiry at the offices of the Cuckfield Rural District Council into an application made by them for a Provisional Order forming the rural district of Cuckfield and the urban districts of Cuckfield and Haywards Heath into a united district for the purposes of water supply, and to empower the water authority to alter the rates to be charged for water to be used for domestic purposes. Mr. C. H. Waugh presented the case on behalf of the Joint Water Committee, after which Mr. S. T. Maynard, representing the Burgess Hill Water Company, and Mr. White, representing the East Grinstead Rural Council, made a few remarks. The Rev. F. S. Sclater asked that the position of Wivelsfield might be clearly defined in the Order, as between the Cuckfield Rural Council and the Burgess Hill Water Company the Chailey Council had been unable to act in the matter of providing Wivelsfield with water. The Inspector said the Board would see that the point was kept in view. There was no opposition to the application.



WHEN you are placing before a Consumer the advantages of a Gas Cooker, which make would you recommend his adopting?

Surely the latest, fitted with all this years' improvements, the result of much labour, thought and world-wide experience, and manufactured by the Pioneers of that particular business.

Wright's

"NEW CENTURY"

Gas Cooker.

We guarantee its Efficiency in all respects.

JOHN WRIGHT & CO.,
B'HAM.

Gas Explosion at Rotherham.

A gas explosion, which caused considerable damage to property, but fortunately no bodily injury, occurred at Rotherham last Tuesday week. The building that suffered most was the Reindeer Inn; but the house next door to it was also badly knocked about. Earlier in the day the presence of escaping gas had been detected in the latter; and the Gas Department were communicated with. On investigation, it was found that the cause of the trouble was a broken gas-main, which necessitated excavation. This work had been in progress three hours when the explosion occurred. The usual precautions had been observed. These included a request made to the occupiers of adjacent houses that they should have no fires or lights of any description in the houses until the escape was remedied, and that windows and doors should be allowed to remain open. Four or five men were working at the main, and had just found the breakage, when the explosion occurred. Immediately afterwards an examination of the Reindeer Inn showed that there were two fires alight, and some of the windows had not been opened. The accumulated gas came in contact, it is assumed, with the fires, and thus caused the explosion. The subsoil on which the inn is built is made-ground, which allowed the escaping gas to percolate to the surface. Alderman Gummer, J.P., the Chairman of the Gas Committee, was quickly on the scene; and with him was Mr. J. S. Naylor, the Engineer and Manager. The latter was actually on his way to see how the men were going on with the work at the time of the accident.

Bristol Public Lighting.

The Works Sub-Committee of the Sanitary Committee of the Bristol Corporation recently had before them a memorial presented to the Lord Mayor, towards the close of last year, from the Ratepayers' Non-Political Association, in which complaint was made at the abnormally high rates, and an opinion was expressed that as good street lighting could be obtained from gas as from arc lamps, and that some thousands of pounds a year could be saved if gas were substituted for electricity. The Sub-Committee recommended that the following report on the subject should be presented to the Council: "Your Committee would remind the Council that they adopted electric street lighting in consequence of the request of numerous sections of ratepayers for a better system of illumination in the principal thoroughfares of the city; and your Committee are of opinion that equal illuminating power cannot be obtained from gas at as low a cost as from electricity. In 1892 (before the adoption of electric street lighting), the proportion of the general district rate appropriated to street lighting amounted to 5·62d. in the pound per annum, the number of public lamps being 5548. At the present time, the portion of the rate appropriated to street lighting amounts to 5·58d. in the pound per annum, the number of public lamps of all descriptions (including arc lamps) being 9638; showing that, notwithstanding the large increase in the number of lamps, the citizens have obtained the benefit of ample illumination in the principal thoroughfares without any additional burden being cast upon the rates. Your Committee are of opinion that this result could not possibly have been obtained had it not been for the introduction of a system of illumination in competition with gas; and as the benefit arising from the lowering of prices due to this competition is enjoyed not only by the Corporation but by all private consumers, they decline to recommend the Council to revert to a system by which all competition is precluded." The report was adopted, and it will be presented at the next meeting of the Council.

In response to an application from the Finance Committee for a grant as usual from the gas profits in relief of the rates, the Belfast Gas Committee a few days ago unanimously resolved that a sum of £20,000 be paid out of the gas fund for this purpose.

At the last monthly meeting of the Bingley Urban District Council, some discussion took place as to where the responsibility rested for the expense in dealing with some choked ascension-pipes at the gas-works, which caused a shortage of gas for several days recently. The question was, however, deferred for fuller consideration in committee.

According to some preliminary tables of cases of industrial poisoning and fatal accidents in factories, workshops, &c., during the past year which have just been issued, there were 17 fatalities in gas-works, compared with 26 in the year 1905. Five were due to machinery moved by mechanical power, one to an explosion, one to an escape of gas, and ten to various causes.

Messrs. Bland and Co. have received a letter from Mr. W. R. Herring, of Edinburgh, in reply to a request made by them that he should have one of their inverted gas-burners tested. Mr. Herring says: "We have now completed our experiments, and I am happy to be able to report that the results we obtain are fully equal to what is claimed in the circular, and that this burner is undoubtedly one of the best on the market."

The second annual dinner of the Inspectors in the Maintenance Department of the South Metropolitan Gas Company, took place at the Horns Hotel, Kennington, on the 16th inst., under the presidency of Mr. H. C. J. Edwards, the chief of the department. The toast of the evening, "The South Metropolitan Gas Company and their Maintenance Department," was proposed by Mr. G. F. Morgan, who alluded to the excellent work done by the department, and to the ever-courteous attention of its chief. Mr. H. C. Gay, in replying, said the work was an educational one for the benefit of the consumers, and its usefulness was evidenced by the fact that in the short space of five years it had grown so rapidly that the department now maintained 50,000 burners a year. In responding to the toast of "The Chairman," Mr. Edwards expressed his pleasure at seeing such a gathering, which he took as an honour, not to himself, but to the Company under whose banner they served with such honoured chiefs as Sir George Livesey and Mr. Charles Carpenter. Other toasts were proposed; and the proceedings were enlivened by selections of vocal and instrumental music, under the direction of Mr. J. Golding.

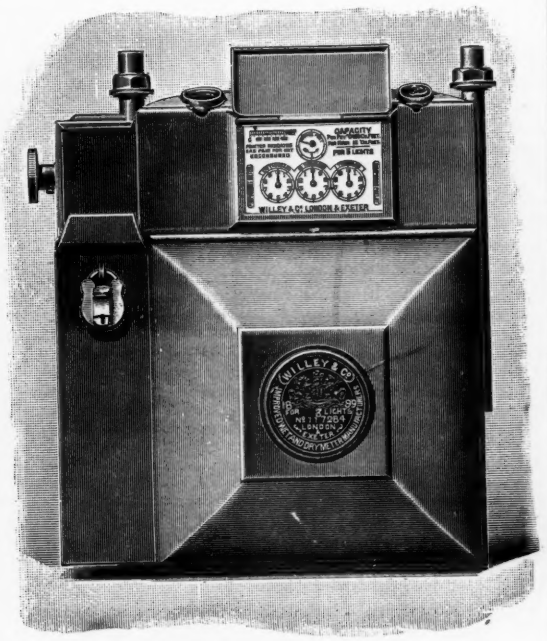
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD., LONDON & EXETER.

AGENTS FOR SCOTLAND:

D. M. NELSON & CO., 53, WATERLOO STREET, GLASGOW.

The Seisdon Rural District Council have applied to the Local Government Board for sanction to borrow £6000 for the provision of a water supply for the village. The loan asked for includes £1000 for the purchase of Kinver Mill, £4310 for machinery and contingencies, and £689 for extensions.

By permission of Mr. R. Sharpe, the Manager of the Belfast Corporation Gas-Works, the members of the class for gas officials held at the Municipal Technical Institute visited the works on the 16th inst. At the two previous meetings of the class, Mr. A. Percy Hoskins, F.I.C., the Analyst at the works, had lectured on "The Manufacture of Gas;" and the visit was intended as a practical demonstration of the principles and processes laid down in the lectures. On their arrival, the party were met by Mr. Hoskins, and they immediately entered upon the tour of the works. Following the plan of the class work, the order adopted was that of manufacture, commencing with the reception of the coal and ending with the despatch of the finished product. At the conclusion of the inspection, Mr. A. Williamson, the teacher of the class, thanked Mr. Hoskins for his interesting and instructive lectures and demonstration.

Messrs. R. & W. Hawthorn, Leslie, and Co., Limited, of Forth Banks, Newcastle-on-Tyne, have acquired, for an extension of their locomotive works, the chief part of the works formerly occupied by Messrs. R. Stephenson and Co. The two works have been established on adjoining sites for nearly a century.

The Richmond Gas Stove and Meter Company, Limited, held the half-yearly conference of their representatives last Friday, at their Warrington works—Mr. H. M. Thornton presiding. During the afternoon, a visit was paid to the new works at Grappenhall, and in the evening the representatives were entertained at dinner.

We have received from Messrs. C. & W. Walker, Limited, a pamphlet on Milbourne's patent luteless purifiers and valves, of which they are the sole makers. These appliances are shown in great variety, and the illustrations are accompanied by suitable descriptive letterpress. The diagrams showing various arrangements of connections with either inside or outside valves will be found useful, as will also the notes on the design of purifiers, and the advantages of those of the luteless type. The illustrations are very clear, and the pamphlet as a whole is a good specimen of printing.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GENERAL MANAGER (NEW LIGHTING AND HEATING GAS). Garlick and Co.
CARBONIZING FOREMEN. No. 4725.
WORKS FOREMAN. No. 4715.
WORKING FOREMAN. No. 4727.
CLERK. No. 4726.

Situations Wanted.

GAS-STOVE REPRESENTATIVE. No. 4722.
INDEX READER AND OFFICE WORK. 50, Woodward Road, East Dulwich.
MAIN AND SERVICE LAYER, &c. No. 4730.
SHOW-ROOM MANAGER OR INSPECTOR. No. 4729.

Plant, &c., For Sale.

BOILER, &c. No. 4728.
ENGINE AND EXHAUSTER. Mansfield Gas Department.
PIPES AND TANKS. No. 4721.
RETORT-BENCH FITTINGS, MOUTHPIECES, RETORTS, &c., &c. Arbroath Gas Department. Tenders by March 10.
STATION METER. Leatherhead Gas Company.

Stocks and Shares.

ALDERSHOT GAS COMPANY. March 19.
CAPE TOWN GAS COMPANY. March 6.
CHERTSEY GAS COMPANY. March 12.
CROYDON GAS COMPANY. March 6.
GLOVER AND MAIN, LIMITED. March 6.
HAMPTON COURT GAS COMPANY. March 12.
LEA BRIDGE GAS COMPANY. March 12.
PINNER GAS COMPANY. March 21.
SOUTHGATE AND DISTRICT GAS COMPANY. March 19.
SOUTHEND GAS COMPANY. March 12.
UXBRIDGE GAS COMPANY. March 12.

Company Meeting.

CAGLIARI GAS AND WATER COMPANY. Offices. March 5. Three o'clock.

Gas-Works Concession For Sale.

"Gas Engineer," c/o Horncastles.

Use of Retort-Bench.

"Secretary," Adelphi.

TENDERS FOR

Benzol.

MIDDLETON GAS DEPARTMENT. Tenders by March 11.

Chimney Stack.

BRECON GAS COMPANY. Tenders by March 6.

Coal and Cannel.

NELSON GAS DEPARTMENT. Tenders by March 14.
PADIHAM GAS DEPARTMENT. Tenders by March 11.
SALFORD GAS DEPARTMENT. Tenders by March 14.
SEAFORD GAS COMPANY. Tenders by March 9.

Condensers, &c.

BRECON GAS COMPANY. Tenders by March 6.

Fire-Clay Goods.

BRECON GAS COMPANY. Tenders by March 6.
LONG EATON GAS COMPANY.
MIDDLETON GAS DEPARTMENT. Tenders by March 11.

General Stores, Brass Taps, Fittings, Ironmongery, Lime, Oil, Paint, &c.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 5.
MIDDLETON GAS DEPARTMENT. Tenders by March 11.
NELSON GAS DEPARTMENT. Tenders by March 14.

Mantles and Chimneys.

DUBLIN CORPORATION. Tenders by Feb. 28.

Meters.

MIDDLETON GAS DEPARTMENT. Tenders by March 11.

Oil.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 5.
CARLISLE GAS DEPARTMENT. Tenders by March 4.
MIDDLETON GAS DEPARTMENT. Tenders by March 11

Oxide of Iron.

CARLISLE GAS DEPARTMENT. Tenders by March 4.

Pipes and Fittings, &c.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 5.
MIDDLETON GAS DEPARTMENT. Tenders by March 11.

Purifiers, &c.

BRECON GAS COMPANY. Tenders by March 6.
KEIGHLEY GAS DEPARTMENT. Tenders by March 12.
LONG EATON GAS COMPANY.

Retort-Bench, &c.

BRECON GAS COMPANY. Tenders by March 6.

Sulphuric Acid.

MIDDLETON GAS DEPARTMENT. Tenders by March 11
NELSON GAS DEPARTMENT. Tenders by March 14.
RAMSGATE GAS DEPARTMENT. Tenders by March 9.

Tar and Liquor.

CARLISLE GAS DEPARTMENT. Tenders by March 4.
EXETER GAS COMPANY. Tenders by March 9.
NELSON GAS DEPARTMENT. Tenders by March 14.
PADIHAM GAS DEPARTMENT. Tenders by March 11.
RAMSGATE GAS DEPARTMENT. Tenders by March 9.
STOKE GAS DEPARTMENT. Tenders by March 6.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 524.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
245,112	10	,,	7⅞	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	Nov. 14	7	Bombay, Ltd.. . . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5—5⅛	..	5 1 10
50,000	10	Aug. 30	14	Bourne- mouth Gas and Water } 10 p.c. B 7 p.c. Pref. 6 p.c.	28—29	..	4 16 7
51,810	10	,,	7		17—17½	..	4 0 0
53,200	10	,,	6		15—16	..	3 15 0
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	258—263	−4	4 15 1
300,000	,,	,,	9⅜	Do. New . . .	195—200	−5	4 15 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	120—125	..	4 0 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	101—104	..	3 16 11
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	225—230	−7	4 17 10
246,320	,,	,,	8½	Do. A. Ord. Stk. .	163—168	..	4 18 3
460,000	20	Sept. 27	10	British	42—43	..	4 13 0
104,000	Stk.	Aug 15	6	Bromley, Ord. 5 p.c. .	121—125	..	4 16 0
165,700	,,	,,	4½	Do. do. 3½ p.c. .	91—94	..	4 15 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11½—12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb. .	94—96	..	4 3 4
150,000	20	July 12	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
100,000	10	Oct. 26	4½	Do. 4½ p c Pref. . .	8½—9½	..	4 14 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	50—52	..	5 15 5
50,000	Stk.	Dec. 28	4½	Do. 4½ p.c. Deb. Stk.	96—98	..	4 11 10
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord. . .	110—112	..	4 9 3
1,443,280	Stk.	Aug. 30	5⅞	Commercial 4 p.c Stk. .	110—113	..	4 12 0
560,000	,,	,,	5	Do. 3½ p.c. do. .	108—111	..	4 10 1
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	83—85	..	3 10 7
800,000	Stk.	,,	6½	Continental Union, Ltd.	123—126	−2	5 3 2
200,000	,,	,,	7	Do. 7 p c. Pref.	138—143	..	4 17 11
432,070	Stk.	Aug.	5⅝	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	105—107	..	3 14 9
486,090	10	Jan. 31	11	European, Ltd. . . .	24½—25½	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 10
15,203,110	Stk.	Feb. 14	4⅝	Gas- light and Coke } 4 p.c. Ord. . .	95½—96⅝*	..	4 11 4
2,600,000	,,	,,	3⅜		87—89*	−1	3 18 8
3,799,735	,,	,,	4		106—108*	..	3 14 1
4,193,975	,,	Dec. 13	3		84—86	..	3 9 9
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	98—103	..	4 17 1
82,500	,,	,,	6⅔	Do. do. 5 p.c.	118—121	..	5 7 5
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	19½—20½	..	5 7 4
4,940,000	Stk.	Nov. 14	8	Imperial Continental .	179—182	−2	4 7 11
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	93—95*	..	3 13 8
183,242	Stk.	Aug. 30	6	Lea Bridge Ord. 5 p.c. .	120—125	..	4 16 0
306,083	,,	Dec. 28	4	L'rpool Unit'd Deb. Stk.	110—112	+1	3 11 5

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 30	10	Liverpool United A . .	226—228	..	4 7 9
718,100	,,	,,	7	Do. B .	167½—163½	..	4 3 1
144,140	Stk.	Feb. 14	7⅛	Maidstone 5 p.c. . .	142—147*	..	5 3 8
75,000	5	Nov. 29	5	Malta & Medn., Ltd. .	4¼—4¾	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb..	101—103	..	4 17 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	Nov. 14	3½	Monte Video, Ltd. . .	11½—12½	..	5 12 0
1,775,892	Stk.	Aug. 15	4⅛	Newc'tle & G'tesh'd Con.	110—111	..	4 3 4
406,025	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	96—97	..	3 12 2
15,000	10	Aug. 30	10	North Middlesex 10 p.c.	20—21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13½—14½	..	4 16 7
300,000	Stk.	Nov. 29	8	Oriental, Ltd. . . .	150—155	..	5 3 3
60,000	5	Sept. 13	7	Ottoman, Ltd. . . .	6—6¼	..	5 7 8
398,490	5	Oct. 26	7	Primitiva Ord. . . .	7⅜—8½	..	4 6 2
796,980	5	Jan. 31	5	Do. 5 p.c. Pref. .	5—5¼	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	94—96	..	4 3 4
851,070	10	Oct. 12	7	River Plate Ord. . . .	12¼—12⅝	..	5 7 8
300,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
250,000	10	Sept. 27	8	San Paulo, Ltd. . . .	13—13¼	..	5 18 6
125,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	48—50	..	5 0 0
135,000	Stk.	Sept. 13	10	Sheffield A	248—250	..	4 0 0
209,984	,,	,,	10	Do. B	248—250	..	4 0 0
523,500	,,	,,	10	Do. C	248—250	..	4 0 0
70,000	10	Oct. 26	10	South African	15½—16½	..	6 1 3
6,350,000	Stk.	Feb. 14	5⅓	South Met., 4 p.c. Ord.	24—126*	..	4 7 4
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	84—85	..	3 9 9
201,720	Stk	Sept. 13	8	South Shields Con. Stk.	158—160	..	5 0 0
605,000	Stk.	Aug. 15	5½	S'th Suburb'n Ord. 5 p.c.	123—126	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	123—126	.	3 19 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	125—130	..	3 16 11
502,310	Stk.	Nov. 14	5	Southampton Ord. . .	107—112	..	4 9 3
120,000	Stk.	Aug. 30	6½	Tottenham and Edmonton } A 5 p.c. B 3½ p.c. 4 p.c. Deb.	127—130	..	5 0 0
398,940	,,	,,	5		104—106	..	4 14 4
137,500	,,	Dec. 28	4		101—103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	10½—11	..	7 5 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	102—104	..	4 16 2
193,742	Stk.	Sept. 13	5	Tynemouth 5 p.c. max.	106—108	..	4 12 7
30,000	Stk.	Feb. 14	8	Wands- worth and Putney } A 5 p.c. B 3½ p.c. C 3½ p.c. 3 p.c. Deb. Stk.	—	..	—
255,636	,,	,,	6½		138—143*	..	4 10 11
75,000	,,	,,	5⅝		111—113*	..	4 19 1
79,416	,,	Dec. 28	3		79—82	..	3 13 2
845,872	,,	Aug. 15	5⅛	West Ham 5 p.c. Ord. .	104—107	..	4 15 9
185,000	,,	,,	5	Do. 5 p.c. Pref. .	122—125	..	4 0 0
228,300	,,	Dec. 28	4	Do. 4 p.c. Deb. Stk.	102—105	..	3 16 2

Prices marked * are "Ex div."